First edition, 1965
Second edition, 1969
Third edition, 1973

ISBN 90 247 0032 9 (two vols)
90 247 0034 5 (vol. two)

PRINTED IN THE NETHERLANDS

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VOLUME TWO

Philosophers of Nature

2. EMPEDOCLES OF AKRAGAS

(521 – some time after 444 B.C.)

INTRODUCTION

Chronologically, as far as publication is concerned, the first to shed the naive idea of a changeable element, to assume something unchangeable and then, of course, a plurality of such ultimate constituents of the universe, was not Anaxagoras, but Empedocles.

Yet, for his deviation from the transformism of the predecessors no motives can be found in the extant fragments of his writings, whereas with Anaxagoras the motives are completely clear. This is one more reason for giving credence to the report that Anaxagoras was the teacher who just published later, while Empedocles, the none too faithful disciple, rather early began to develop a certain habit of borrowing.

The Ostensible Influence of Parmenides

It is one of those allegedly established facts that the assumption by Empedocles (as well as Anaxagoras) of unchangeable elements was caused by the Parmenidean rejection of all Becoming, the doctrine that in the very notion of Becoming there is some intrinsic contradiction.

However, just as it has been shown concerning Anaxagoras (cf. p. 323), so with Empedocles, too, the immutability of the elements may in fact have had hardly anything to do with any influence of Parmenides. For, to say it once more, if indeed Empedocles or Anaxagoras had had any regard for the ostensible difficulties in the notion of Becoming, they would have had to do away with all Becoming. Yet, it is only their elements that are *ageneta*. Everything else is a ceaseless becoming, an uninterrupted sequence of mixture and interchange, of *mixis* (μῖξις) and *diallaxis* (διάλλαξις). But according to Parmenides, no change of place, no *topon allassein* (τόπον ἀλλάσσειν), would be possible and, consequently, no regrouping of particles, either.

On the other hand, there is in the pseudo-Aristotelian writing *De Melisso Xenophane Gorgia* a passage about Empedocles that sounds even downright Heraclitean. This passage – quoted neither by Diels nor Kranz among the reports on Empedocles, but merely among reports on Melissus – reads as follows:

But similarly also Empedocles (sc., just as Anaxagoras) says that "the moved with each other" [1] (*i.e.*, the universe moved in itself) are always in motion uninterruptedly all the time throughout, and that yet there is nothing empty. . . . For what hinders that things move toward each other and at the same time immediately transpose themselves by anything regrouping itself into something else, this, in turn, into something different, and this back again into the first all the time?

ὁμοίως δὲ καὶ ὁ Ἐμπεδοκλῆς κινεῖσθαι μὲν ἀεί φησι συγκινούμενα [1] τὸν ἅπαντα ἐνδελεχῶς χρόνον, ‹κενὸν› δὲ οὐδὲν εἶναι. . . . τί γὰρ κωλύει εἰς ἄλληλα φέρεσθαι καὶ περιίστασθαι ἅμα ὁτουοῦν εἰς ἄλλο, καὶ τούτου εἰς ἕτερον, καὶ εἰς τὸ πρῶτον ἄλλου μεταβάλλοντος ἀεί;

[Arist.] de Melisso Xenophane Gorgia 976b23 ff.

If, therefore, in this respect there was any influence at work, it was rather Heraclitean than Parmenidean.

What Empedocles did say, putting into verses what he had learned in the lectures of the master, is merely that nothing originates from nothing and that nothing turns into nothing:

Fools they are indeed: for not far-seeing thoughts do those have
Hoping what has not been there before can begin to exist
Or that anything dies and is getting destroyed completely.

νήπιοι· οὐ γάρ σφιν δολιχόφρονές εἰσι μέριμναι,
οἳ δὴ γίγνεσθαι πάρος οὐκ ἐὸν ἐλπίζουσιν
ἤ τι καταθνήσκειν τε καὶ ἐξόλλυσθαι ἁπάντῃ.

fr. 11

And:

From what in no way is, there is no origination
And it's absurd and unconceived that what is be destroyed.

ἔκ τε γὰρ οὐδάμ' ἐόντος ἀμήχανόν ἐστι γενέσθαι
καί τ' ἐὸν ἐξαπολέσθαι ἀνήνυστον καὶ ἄπυστον.

fr. 12.

This, however, does not mean that there is no Becoming, not that a this-way-being cannot become an otherwise-being. Already Plutarch, when quoting what is now fragment 11, angrily rejected that old misinterpretation:

[1] I keep to the handed down reading συγκινούμενα. The only different versions in various manuscripts are συγκινόμενα and συγκοινόμενα. The unwarranted change into συγκρινόμενα (Diels, Kranz) is meaningless in this context.

To anybody who has ears, these are the words of one who loudly shouts that he does not do away with origination, but with origination from not-being, nor with destruction, but with complete destruction, that is: such destruction as would annihilate (things) into the not-being.

ταῦτα . . . τὰ ἔπη μέγα βοῶντός ἐστι τοῖς ὦτα ἔχουσιν, ὡς οὐκ ἀναιρεῖ γένεσιν ἀλλὰ τὴν ἐκ μὴ ὄντος, οὐδὲ φθορὰν ἀλλὰ τὴν ἁπάντῃ, τουτέστι τὴν εἰς τὸ μὴ ὂν ἀπολλύουσαν.

Plut. adv. Col. 12, p. 1113 C.

Furthermore, according to Parmenides (cf. p. 531 ff.), there is only pure Being, but no specified Being. Therefore, any air-being, earth-being, water-being, fire-being would be inadmissible.

And finally, to Parmenides all cognition is restricted to pure thinking, and the senses are incapable of any cognition. Empedocles, however, exactly as Anaxagoras, does not consider an intrinsic inadequacy of the senses the hindrance of cognition, but merely the narrowness of the fields of sensation, the shortness of human life, and the like (cf. fr. 1). Yet, these same senses cannot be replaced by anything else.

Thus, the time-honored story of the ostensible influence of Parmenides upon Empedocles or Anaxagoras or even Democritus would seem to rest on rather sandy ground.

On the other hand, it would be wrong (as already mentioned, cf. p. 288, n. 5) to take the work of Empedocles merely for a popularization of Anaxagorean doctrines. For Empedocles was gleaning from several fields.

But still he cannot just simply be called an eclectic. Apart from certain outstanding new contributions of his own, his very skill in combining the various ingredients into an imposing structure is in itself ingenious.

An Iridescent Personality

Empedocles was not only a philosopher. He was also a physician, a priest, an orator, and a politician. With regard to his multifarious, iridescent personality, he has justly been called "one of the most arresting figures of the pre-Socratic Olympus." [1] There was, at any rate, something histrionic about him, something exaggerated. He liked

[1] Werner Jaeger, *l.c.*, p. 132.

to show off, to play the man of mystery. No wonder that such-like features have hurt his reputation. There were indeed among his contemporaries quite a few who considered him a *goes* (γόης), a swindler, an impostor and charlatan.

Yet, nevertheless, the essentials of his philosophy are solid and sound, though none too original.

Chronology

According to Apollodorus' *Chronics* (as late as 70 B.C.), Empedocles was born allegedly in 483 B.C. and died in 423, having reached an age of sixty years, as Apollodorus gathered from a remark in Aristotle.

This chronology is full of difficulties. An attempt to remove them by fixing Empedocles' lifetime as 495/90–435/30 [1] turns out to be unsatisfactory. The only reasonable suggestion seems to have been made already by Georg Friedrich Unger in 1884.[1]

According to Unger, Empedocles was born in 521 or 520 B.C., disappeared in 461 to live in hiding somewhere in the Peloponnesus, emerged from there in 444 when, according to Glaukos of Rhegion (cf. Diog. Laert. IX 38; A 1), he was seen for a short time in the new colony of Thurioi, and then again disappeared, this time for good. Nobody, therefore, could have known when exactly he died. But he would then have reached an age of at least 77.

Unger's paper was first vehemently rejected and then passed over in silence. Bidez, e.g., called Unger's chronology *"impossible"* and his results *"de la haute fantaisie"* (*l.c.*, p. 130). Yet, in his old age this same scholar must have forgotten what in 1894 he had so decidedly maintained. For in 1938, in his (and Franz Cumont's) famous work *Les Mages Hellénisés*, he made (vol. I, pp. 238–240) some very illuminating remarks on Empedocles that only make sense on the basis of Unger's *"chronologie impossible"* (as will be shown presently).

I keep to Unger's statements in the main. According to him, Empedocles, scion of a noble and rich Sicilian family, was a famous man already when in 472 B.C., at the age of about 48 years, he embarked on a political career in his native town of Akragas. This career began with his bringing about the indictment and execution of two harmless, innocent people; led him to the height of power – even the crown was offered him which he shrewdly refused to accept –; only to end with

[1] Joseph Bidez, *La Biographie d'Empédocle*, Gand, 1894, p. 155. G. F. Unger, "Die Zeitverhältnisse des Anaxagoras und Empedokles," *Philologus* IV (1884) Suppl., 511–550.

his banishment from Akragas, presumably in 467/6, and with the prohibition of his return when in 461 his fellow-exiles were permitted to come home. Not in Akragas itself, of course, but not far from it, he then staged, with his disciple Pausanias and other intimate friends, that mysterious end of his earthly life to confirm his alleged divinity, while in fact he left Sicily for the Greek mainland where henceforth, with one short interruption, he lived anonymously for the rest of his days in some hidden corner of the Peloponnesus.

His fabrication, incidentally, about the miraculous end of his life was a success. In antiquity as well as in modern times, the legend about Empedocles' jump into the Etna volcano has met with willing listeners.

During his political career that was combined with his activities as a renowned physician, Empedocles might not have found much leisure for literary work. Unger may be right when suggesting that all or most of Empedocles' writing must have been done before 472 B.C. (*l.c.*, p. 550).

Empedocles' Philosophical Education

From the viewpoint of the history of philosophy, the development of this man in the time before 472, in the first 48 years of his life, would be of paramount interest, needless to say.

According to a well-known philologist, an attempt at reconstruction of this development would be an hopeless enterprise. "And how at all the young Empedocles became what he was, this remains completely and entirely hidden to us," he discouragingly asserts.[1]

Such pessimism does not seem to be quite justified, however. There are a number of reports with statements concerning this question. If read without prejudice, they can fittingly be pieced together. One merely has to avoid an attitude of "passing over anything unworthy of belief," [2] because this would imply a dangerous *petitio principii*, blocking the discovery of any hitherto unnoticed connections.

The famous historiographer Timaios of Tauromenion (350–255 B.C.) has recorded (cf. Diog. Laert. VIII 54; A 1) that Empedocles "was a hearer of Pythagoras" (ἀκοῦσαι δ' αὐτὸν Πυθαγόρου), but that, "having been found guilty of theft of the doctrine, was at that time denied (further) participation in the lectures (just as Plato [sc., recently]).

[1] "Und wie der junge Empedokles gar wurde, was er war, das bleibt uns ganz und gar verborgen." (W. Kranz, *Empedokles. Antike Gestalt und romantische Neuschöpfung*. Zürich, 1949, p. 20.

[2] "Alles Unglaubwürdige übergehen wir." (W. Kranz, *l.c.*, p. 350, n. 6.

(καταγνωσθεὶς ἐπὶ λογοκλοπίᾳ τότε [καθὰ καὶ Πλάτων] τῶν λόγων ἐκωλύθη μετέχειν.) And what exactly is meant here by "theft of the doctrine" can be gathered from Neanthes' (ca. 300 B.C.) report (cf. Diog. Laert. VIII 55; A 1) that "because he (sc., Empedocles) gave them (sc., the lectures) out to the public at large by way of his poetry, they (sc., the Pythagoreans) made it a law not to communicate them henceforth to any versifier. (The same, however, . . . happened to Plato; for he, too, was expelled.)" (ἐπεὶ δ' αὐτὸς διὰ τῆς ποιήσεως ἐδημοσίωσεν αὐτά, νόμον ἔθεντο μηδενὶ μεταδώσειν ἐποποιῷ [τὸ δ' αὐτὸ καὶ Πλάτωνα παθεῖν φησι· καὶ γὰρ τοῦτον κωλυθῆναι].)

That would indicate that Empedocles must have been a candidate for a while and then was expelled because he offended against the duty of secrecy. Thus he might have had opportunity indeed for picking up quite a bit, although perhaps not the innermost secrets of the doctrine.

To that versified popularization of Pythagorean tenets, incidentally, may have belonged those verses in praise, obviously, of Pythagoras of which the first two lines are also quoted by Timaios in connection with his report mentioned above:

> There was among them a man who knew tremendous things,
> Who had gathered indeed the largest wealth of ideas
> And had the fullest command over every kind of skill.
> For whenever he stretched himself with all of his thinking,
> Easily would then he see each thing of all that exist
> In his ten and even twenty human lifetimes.

> ἦν δέ τις ἐν κείνοισιν ἀνὴρ περιώσια εἰδώς,
> ὃς δὴ μήκιστον πραπίδων ἐκτήσατο πλοῦτον,
> παντοίων τε μάλιστα σοφῶν <τ'> ἐπιήρανος ἔργων·
> ὁππότε γὰρ πάσῃσιν ὀρέξαιτο πραπίδεσσιν,
> ῥεῖ' ὅ γε τῶν ὄντων πάντων λεύσσεσκεν ἕκαστον
> καί τε δέκ' ἀνθρώπων καί τ' εἴκοσιν αἰώνεσσιν.

fr. 129 (Porphyr. V. Pyth. 30).

That there had been, at any rate, some sort of close connection between Empedocles and the Pythagoreans was considered an established fact in later antiquity, so that Athenaeus (ca. 200 A.D.), *e.g.*, just plainly called him a Pythagorean (I 5E; A 11).

Then there is a report (by Theophrastus; A1, 55) to the effect that Empedocles was a hearer and disciple of Parmenides, and another one (by Hermippos, 3rd century B.C.; A1, 56) that it was not Parmenides, but Xenophanes whom Empedocles imitated.

There is indeed a feature common to Xenophanes, Parmenides, and Empedocles: all three of them wrote their philosophies in verses. With Xenophanes who made a living as a rhapsodist, this was quite natural, after all. But then his example obviously had the effect of making it fashionable in Southern Italy and Sicily to write philosophy in the form of poetry.

Not much of genuine poetry was involved, though, either in Parmenides' or Empedocles' verses, so that already Aristotle made the somewhat vitriolic remark (Poet. I 1447b17; A 22) that the only thing common to Homer and Empedocles was the metre . . .

If, therefore, Empedocles did imitate Parmenides, or Xenophanes for that matter, then only as a versifier.

Among the various reports, however, there is one that stands out as particularly illuminating. It could virtually be called a succinct and summary description of Empedocles' philosophical development. This report has already been briefly mentioned when in the presentation of the system of Anaxagoras the true relationship between Anaxagoras and Empedocles has been pointed out (cf. p. 287). But it seems worthwhile taking up that statement again. According to Diogenes Laertius,

> Alkidamas in the Physics reports that at the same time Zeno and Empedocles attended lectures by Parmenides; that later they left and that (then) Zeno philosophized in his own way, but that the other one (sc., Empedocles) attended the complete courses (διακοῦσαι) of Anaxagoras' lectures and of Pythagoras', and that of the one (sc., Pythagoras) he (then) imitated the dignified ceremoniousness in the habits of life as well as in outward appearance, but of the other one (sc., Anaxagoras) the natural philosophy.

> Ἀλκιδάμας δ' ἐν τῷ Φυσικῷ φησι κατὰ τοὺς αὐτοὺς χρόνους Ζήνωνα καὶ Ἐμπεδοκλέα ἀκοῦσαι Παρμενίδου, εἶθ' ὕστερον ἀποχωρῆσαι, καὶ τὸν μὲν Ζήνωνα κατ' ἰδίαν φιλοσοφῆσαι, τὸν δὲ Ἀναξαγόρου διακοῦσαι καὶ Πυθαγόρου· καὶ τοῦ μὲν τὴν σεμνότητα ζηλῶσαι τοῦ τε βίου καὶ τοῦ σχήματος, τοῦ δὲ τὴν φυσιολογίαν.

Diog. Laert. VIII 56; A 1.

Alkidamas, a contemporary of Plato's, was a disciple of Gorgias' who himself was a pupil of Empedocles'. Alkidamas, therefore, had indeed "good opportunities of knowing" (Burnet). His report gives an almost

complete outline of the components of Empedocles' development, as far as philosophy is concerned:

First – perhaps shortly after 500 B.C. – he attended lectures by Parmenides in Elea, but did not become a disciple. It was only natural that the utterly "discoursive" *Einai*-philosophy, with its uncompromising rejection of the senses, could not appeal to a mind of such lively and plastic imagination as Empedocles'. His emphasis on the trustworthiness of the senses, and what is more: the equal trustworthiness of all of them (fr. 3, v. 9–13) – an implicit rejection, by the way, of any distinction between "primary" and "secondary" qualities even before such distinction was proclaimed – is obviously an outspoken attack upon Parmenides.

Then from Elea he may have gone to Croton and become a hearer of Pythagoras. Burnet and others try to persuade their readers that Alkidamas cannot have meant "Pythagoras," but "Pythagoreans" (cf. p. 287 n. 1). Why? – Because, it is implied, Pythagoras was not alive any more when Empedocles was born. Yes, – but only if he was born in 483! If, however, Empedocles was born in 521, and Pythagoras emigrated from Samos to Croton, say, in 529 and lived in Southern Italy until about 493, it would be quite a different story. Not to forget that Alkidamas is not alone with his statement. As has been shown above, also the highly reliable historian Timaios has recorded that Empedocles was a hearer of Pythagoras himself.

A fact that has nothing directly to do with Empedocles' philosophical development, but with his medical education, turns out to be a support of the Unger chronology. The reputed teacher of Empedocles in the medical art was the Pythagorean physician Alkmaion of Croton.[1] He was in his prime at the beginning of the fifth century B.C. If Apollodorus were right and Empedocles had been born in 483, he could never have studied medicine with Alkmaion in Croton.

After his expulsion from the Pythagorean sodality Empedocles left for the Greek mainland, perhaps in the late Nineties. He went to Athens where he became one of the earliest disciples of that man from Klazomenai, the greatest natural philosopher of Hellas, Anaxagoras, who for some years already was fascinating the finest minds of Attica.

Bidez (*Biographie d'Empédocle*, p. 155) has raised the question of why Empedocles, a man so eager for glamorous publicity, never, to all appearances, went to Athens. Bidez could find no testimony about any

[1] Cf. Jonathan Wright, "The Forerunners of Empedocles and the Nature Philosophers," in: *Annals of Medical History*, III (1921) p. 375.

sojourn in Athens of Empedocles. He was looking for such a sojourn in the early Thirties of the fifth century – needless to say, in vain. But Bidez himself has then, although rather hesitatingly, in a footnote pointed to a short hint in the lexicon of Suidas under "Acron":

> Acron studied in Athens together with Empedocles.
>
> Ἄκρων ἐσοφίστευσεν [1] ἐν ταῖς Ἀθήναις ἅμα Ἐμπεδοκλεῖ.
>
> *(A 3)*

Acron of Akragas became a popular physician, a competitor of Empedocles in the medical field. And as soon as Empedocles began to gain political power, he used his influence to vehemently hurt Acron's feelings.[2] But in their youth, they were both fellow-students in Athens . . .

Among all the reports on the philosophical education of Empedocles, the testimony of Alkidamas is the earliest. He had indeed "good opportunities of knowing." [3] Hence, it has been only natural for us to take this testimony very seriously.

[1] σοφιστεύειν means here "occupy oneself with academic pursuits," "study," as in Cicero, Epistulae ad Atticum 2.9.3 and 9.9.1.

[2] Acron's application for a special place of burial for his family was turned down because Empedocles pleaded against it for "democratic" reasons. (Cf. Diog. Laert. VIII 65; A 1.)

[3] The way Alkidamas' report has been dealt with by various scholars is highly interesting. Bidez (in his *Biographie d'Empédocle*, p. 125) quotes it in full and then makes not the slightest comment on the statement concerning Anaxagoras. – Unger mentions Alkidamas without quoting him and then (*l.c.*, p. 550) even asserts that "the younger one" (sc., Empedocles) "has influenced the older one" (sc., Anaxagoras). – Wellmann, too, (in: Pauly-Wissowa, *Real-Encyclopädie*, article "Empedokles") mentions Alkidamas, yet does not quote him. He merely remarks that, according to Alkidamas, Empedocles would have been a hearer of Parmenides. Everything else is suppressed. But also Wellmann contends that "Anaxagoras and Melissus already show the influence of Empedocles." – E. Bignone in his book of 688 pages, *Empedocle* (Torino, 1916) never quotes the report of Alkidamas. He merely mentions Alkidamas in one footnote (p. 57) as evidence that Empedocles was a hearer of Parmenides, and in another footnote (p. 114) as evidence that Empedocles and Zeno were fellow-students at that time. All the rest is passed over in silence. – Burnet (EGP, 4th ed., p. 202), as already mentioned (cf. p. 287), praises Alkidamas as a man "who had good opportunities of knowing," yet avoids quoting the report and comments only on part of it, omitting any mention of the statement about Anaxagoras. – Zafiropulo (in his book *Empédocle d'Agrigente*, Paris, 1953) does quote Alkidamas' report, but then, strangely enough, has not a single word of comment on the statement that Empedocles was a disciple of Anaxagoras. – All these scholars have obviously been more or less influenced by Zeller (cf. Zeller-Nestle, *Die Philosophie der Griechen* I, 2, p. 1020 ff.) who, after quoting Alkidamas, makes a grandiose display of authoritative prejudice: The statement about Empedocles having studied under Pythagoras and Anaxagoras "sounds so fantastic that we

Still Another Influence . . .

Philosophically, the Anaxagorean influence had, of course, the strongest impact. Yet, there is to be mentioned still another no less important influence.

The first forty years of Empedocles' life (according to the Unger chronology which we accept) coincide with those turbulent forty years during which in the Persian empire the most conspicuous deed of contemporary history was being performed: the forcible introduction, by the Grandking, of Zoroastrianism as the official religion of the state. At latest when Empedocles was in his twenties, he must have become acquainted with the few basic ideas of that new religion the impact of which on his philosophy is nearly palpable.[1]

When Empedocles was in his thirties, Xerxes acceded to the throne (485 B.C.) and, after mercilessly crushing within the empire the revolts flaring up against the new religion, prepared for conquering the world in the name of Ahura-mazdah, for subduing all the unbelievers, the enemies of Ahura-mazdah and partisans of Anro-mainyu. Xerxes' invasion of Greece was meant as a religious war in favor of a universal monotheism and against the idolatry of all the polytheistic cults, the temples and statues of which he did not fail to destroy throughout the route of his armies.

Empedocles, at that time a full-fledged philosopher already, must have been fascinated by the enterprise of the Grandking. And he was not alone. Even "the god of Delphi," in other words, the clergy of the Delphian Apollo cult, was favorably disposed toward the Persian conquerors.[2]

Empedocles' enthusiasm prompted him even to outline, as Aristotle reports,[3] the sketch for an epic poem he intended to compose in honor of Xerxes' crossing the Bosphorus. Of course, when at Salamis (480 B.C.) and then at Plataeae and Mykale (479) the Greek victories over

have to suspect that that later report on what the well-known disciple of Gorgias" (sc., Alkidamas) "had said has been handed down to us in a distorted form," he declares (adopting a suggestion by Karsten). "Or, if not so, then the only conclusion would be that already Alkidamas, without real knowledge of the facts, must have merely inferred a personal connection from the kinship of opinions."

[1] It will be interesting to see how different the effect of this influence on Empedocles was from the effect of that same influence on Heraclitus.

[2] Cf. Bidez and Cumont, *Les Mages Hellénisés*, vol. I, p. 239.

[3] in one of the extant fragments of the lost dialogue Περὶ ποιητῶν (fr. 70 Rose).

the hosts of the Grandking brought the breakdown of that enterprise, Empedocles was shrewd enough not to compose that Persophile poem, but to yield to the "haughty nationalism" that, as a consequence of those victories, engendered for quite a while "that conspicuous silence of Greece about its previous connections with the Orient." [1] And a sister of Empedocles, according to Aristotle (or a daughter of his, according to Hieronymus), deemed it wise to burn up even the outline of the intended poem . . .

The Writings of Empedocles

None of the writings attributed to Empedocles has been handed down to us in its original extent and form. But quite a number of fragments of two of them have survived: about three and a half hundred verses of his Περὶ φύσεως (*Peri Physeos*, "On Nature") and more than a hundred of his religious poem Καθαρμοί (*Katharmoi*, "Purifications").

Empedocles, namely, was not only a natural philosopher. He made also an attempt at religious reform. He could have been grouped as well with Xenophanes and Heraclitus, and the reason why he is here classified rather as an agenetist is that, on the whole, he is much more of a natural philosopher basically, though none too original, whereas in his religious writing he is original in no way at all.

[1] Bidez and Cumont, *l.c.*, p. 239. To all appearances, J. Bidez and F. Cumont were in modern times the first to point (with reference to Philostratus, Vita Apollonii, I, 2, Plinius, nat. hist., XXX, 1, 9 [A 14], and that Aristotelian fragment) at Empedocles' connections with Persia and Persian doctrine and also to rather plausibly interpret the implications of the Aristotelian report. Bidez has forgotten, however, that all of that interpretation makes sense only on the basis of the "*chronologie impossible*" of Unger he had so vehemently rejected in 1894. The poems, namely, of a three years old child or even, if we presuppose Bidez' own emendation of Apollodorus, the poetical plans, and subsequent change of mind, of a teenager would hardly have been considered worthwhile mentioning by Aristotle. . – Dazzled by the glory and authority of names such as Diels and v. Wilamowitz and, therefore, sticking to the Apollodorus chronology according to which Empedocles would at best have been "still a boy" when the Persians were approaching, F. Altheim (in: *Porphyrios und Empedokles*, Tübingen, 1954, p. 42 ff.) makes an unsuccessful attempt to answer the question of why Empedocles should have at all been interested in the enterprise of Xerxes. His suggestion is that Xerxes' crossing the Bosphorus meant to Empedocles the beginning of a new Zoroastrian "Aion" of 6000 years and a confirmation of his own "claim" to be the "prophet" for this new "Aion," just as (not Zarathustra, but) Pythagoras allegedly had been to him the "prophet" for the previous 6000 years . . . (?) But why should Empedocles have been looking for such a support of such a claim if he was venerated anyway as a miracle-worker and "prophet" by thousands of faithful people who never heard of Zarathustra or of Xanthos the Lydian, for that matter?

Zafiropulo [1] contends that *Peri Physeos* and *Katharmoi* were in fact the only works ever written by Empedocles. There is no good reason, however, for doubting the Aristotelian report (fr. 70 Rose) that Empedocles wrote also various poems, political books (or perhaps only pamphlets), and even some tragedies. Nor is it plausible why Empedocles, renowned and successful physician that he was and one of the champions of the Sicilian school of medicine, should not have written that medical paper (ἰατρικὸς λόγος) or those medical papers (ἰατρικά) attributed to him by Diogenes Laertius and Suidas, respectively.

Yet, this whole question is purely academic anyway since none of these works has survived, and the two extant groups of fragments are at any rate the only ones of interest from the viewpoint of philosophy.

There are remarkable discrepancies between the two works, and since to many scholars the differences seemed even irreconcilable, various problems have arisen, such as: Which of the two was written first? How can one and the same author have made up so different and almost contradictory works? and the like.

All kinds of answers have been suggested. While Bidez [2] considered the *Katharmoi* an early writing and the *Peri Physeos*, the philosophy of nature, a fruit of Empedocles' mature old age, Diels,[2] just the other way round, attributed the *Katharmoi* to the frame of mind of the old Empedocles in the remorse and loneliness of his exile, and A. Döring [2] speaks even of a "conversion" of the philosopher, engendered by the heavy blow of his banishment.

But there are also those who would grade down the differences of the two works and maintain that the two are not so irreconcilable at all. To this group belong W. Nestle, E. Bignone, J. Zafiropulo, a.o.

Nestle,[3] comparing what he calls the "dualism" of Empedocles with the "dualism" of Kant's "pure" and "practical" reasons, holds that such divergent works as *Peri Physeos* and *Katharmoi* could quite well be compatible within the mind of one and the same author.

Bignone,[4] whose voluminous book *Empedocle* is praised by W. Jaeger as "the first step toward a real understanding" (*l.c.*, p. 131),

[1] *Empédocle d'Agrigente*, Paris, 1953, p. 69.
[2] J. Bidez, *La Biographie d'Empédocle*, Gand, 1894, p. 159. H. Diels, "*Ueber die Gedichte des Empedokles*," *Ber. Berl. Akad.* XXXI (1898) pp. 396–415. A. Döring, *Geschichte der griechischen Philosophie*, Leipzig, 1903, I, p. 211.
[3] W. Nestle, "Der Dualismus des Empedokles," in: *Philologus* 65 (1906) p. 545ff.
[4] E. Bignone, *Empedocle*, Torino, 1916.

tries to reveal "the unity behind the opposition" by pointing out that the "mystic" Empedocles is at work also in *Peri Physeos*, just as the "scientist and philosopher" Empedocles takes effect also in the *Katharmoi*.

Zafiropulo [1] wants to persuade the reader that both works constitute merely the double exposition of only one theme: the Pythagorean synthesis, as he calls it, an attempt, namely, to reconcile and reunify the alleged two hostile branches of Pythagoreanism, the "mathematicians" and the "acousmatics," the *savants* and the *illuminés*, and that, in order to make the doctrine accessible to both, Empedocles had to present it in a double form.

Zafiropulo's opinion seems to come closest to historical and psychological truth insofar as he implicitly presupposes a premeditated plan and purpose for the two works, explaining the differences as due to a difference in the type of readers to whom each work applies, and not as a result of any inner development of the author.

It does not appear to be true, however, that the two works are just two forms of the same doctrine. Nor is it probable that the different types of readers to whom Empedocles addressed himself were merely two rival groups of Pythagoreans whom he wanted to become friends again.

Those works, no matter which was the chronological order of their composition, are not two different forms of the same doctrine. They are two different *parts* of one doctrine. They *complement* each other. The one aims at a religious reform and, accordingly, is meant for a broad public at large. The other is a philosophy of nature, meant for a following of selected disciples. Anything, therefore, that has a moral and religious bearing is just slightly touched in the natural philosophy, while in the preaching of the religious tenets anything that could have a discouraging effect is meticulously passed over in silence. Thus both works are indeed as from the same mould.

The main and not always easy task of an interpreter of the extant relics appears to be the task of translating Empedocles' verses into sober, philosophical language and of digging out in this way the real meaning. For all their poetical make-up, with its sometimes bold and even brilliant, sometimes merely bombastic pictures and metaphors, the philosophical poems of Empedocles are not poetry, but versification.

[1] J. Zafiropulo, *Empédocle d'Agrigente*, Paris, 1953, p. 69ff.

PHILOSOPHY OF NATURE

The Six Ultimate Constituents

Empedocles, then, chronologically the first of the Agenetists, assumed a quaternity of unchangeable elements [1]: earth, water, air, and ether.

The Four Elements

There have been various speculations about why Empedocles assumed just four elements. It has to be traced to the Pythagorean influence, some scholars declare (forgetting that the Pythagoreans assumed five elements [cf. p. 455 ff.]). According to others, it stems from Egypt originally where the number four was venerated.

But it could very well be that the true explanation is much simpler. It may have been but the plain, sense-given obviousness: the solid earth, the fluid sea, the hemisphere of air, and, above, the ethereal sky.

The uppermost and outermost world stratum, namely, consists of ether. To Empedocles, this has not the meaning of thin air, but of a peculiar, thin heatstuff that, however, does not shine everywhere, but only around the sun. That is also why in Empedocles it is sometimes called *pyr*, instead of *aither*, *pyr* meaning not fire, as usual otherwise, but a dark heatstuff (exactly as in Pythagorean usage, cf. p. 481 f.). On the other hand, these four elements are the representatives of the four physical conditions as assumed by most of the Greeks, an ethereal condition preceding the gaseous the same way as the gaseous precedes the liquid condition (as already mentioned p. 213).[2]

His four elements Empedocles allegorically calls by the names of gods and goddesses of popular Greek religion:

First, therefore, let me tell you of all that there is the four roots:

[1] It is not true that "no Empedoclean term for 'element' (later called "stoicheion") has been handed down" (Kranz, *l.c.*, p. 42). According to fragment 7, the Empedoclean term for "element" is *ageneton*, as already pointed out (cf. p. 168).

[2] W. Kranz (in his book *Empedokles*, p. 42) first seems likewise to understand the coincidence of the four Empedoclean elements with the physical conditions, but then surprisingly destroys that impression by revealing that to him the "four physical conditions" ("*Aggregatzustände*") are "warm, cold, dry, and moist," thus in a completely wrong way employing a technical term of elementary physics well-known to any high-school freshman.

Zeus the resplendent, the life-bearing Hera, and Aïdoneus, and
Nestis who in her tears is spilling man's fountain of life.

τέσσαρα γὰρ πάντων ῥιζώματα πρῶτον ἄκουε·
Ζεὺς ἀργὴς Ἥρη τε φερέσβιος ἠδ' Ἀιδωνεύς
Νῆστις θ', ἣ δακρύοις τέγγει κρούνωμα βρότειον.

fr. 6 (Aet. I 3, 20; Sext. X 315).

According to Aetios' explanation (l.c., A33), by Zeus is here meant "the boiling heat and the ether" (τὴν ζέσιν καὶ τὸν αἰθέρα), the uppermost world stratum above the hemisphere of air (the word "Zeus" allegedly stemming from *zesis*, "boiling"). Hera is supposed to be the life-preserving air that makes breathing possible. Aïdoneus, obviously meant as another word for Hades, shall stand for "earth." Nestis is a Sicilian word for "water," strictly speaking the name of a water-nymph. By "fountain of mortal life" is meant "human sperma," according to Aetios as well as Stobaios (Ecl. I 10, 11; A 33). Thus "tears of Nestis" means "sperma" as representative designation for "fluid."

In Hippolytus (Ref. VII 29; A 33) and Stobaios (*l.c.*), Hera is interpreted as earth and Aidoneus as air, the air being the "invisible" (from *a-* and *idein*). Which, however, would apply to the underworld as well, after all. But such etymological matters would lead too far away from philosophy.

The allegorical names of the elements have been translated into plain language by Empedocles himself:

Well then, I'll tell you now those mighty, primordial things [1]
Out of which all the things we now see have grown to be seen:
Earth, the billowy ocean, and also the air full of moisture,
Likewise the Titan ether that ties the whole world [2] to a circle.

[1] I agree with v. Wilamowitz who holds that εἰ δ'ἄγε must be the beginning of the verse. The reconstructions of the line as thus far attempted being unsatisfactory, I have tried my hand at it myself. The result seems to be not only philologically possible, but also to make sense philosophically. (τηλίκος means primarily "so big," "so important," "so significant," "so mighty"; then, secondarily, also "so old," or even "so young." <τὰ> πρῶτα <τε> τηλίκα τ' ἀρχήν = "those mighty, primordial things," sc., the elements.

[2] To take here ἅπαντα for the *acc. sing. masc.* belonging to κύκλον (Diels, Kranz) makes no sense. Ἅπαντα is here the *acc. plur. neutr.*, meaning "all things," "the whole world." The Titan ether "ties into a circle" (Empedocles says "circle," but means "sphere"), keeps together to a sphere, the *whole* world: the upper hemisphere of air as well as the lower hemisphere of earth. And the ether is doing so because it is a spherical layer itself.

εἰ δ' ἄγε τοι λέξω <τὰ> πρῶτα <τε> τηλίκα τ' ἀρχήν,[1]
ἐξ ὧν δῆλ' ἐγένοντο τὰ νῦν ἐσορῶμεν ἅπαντα,
γαῖά τε καὶ πόντος πολυκύμων ἠδ' ὑγρὸς ἀήρ
Τιτὰν ἠδ' αἰθὴρ σφίγγων περὶ κύκλον ἅπαντα.[2]

fr. 38 (Clem. Strom. V 48).

The first of the two statements quoted above about the four elements contains an expression that, at a closer look, is rather revealing: Empedocles calls his elements *roots of all things*, πάντων ῥιζώματα (*panton rhizomata*). In itself, such a botanical simile would not be particularly conspicuous. Why, after all, should Empedocles not have used this figurative expression for designating those things from which everything else has been, and still is, originating? Yet, involuntarily one remembers a similar figurative expression in Anaxagoras whose ultimate elements are called *seeds of all things*, σπέρματα πάντων χρημάτων (*spermata panton chrematon*). That seems to be something to ponder about. "Seed," namely, means a first origin to a much higher degree than "root." And as a matter of fact, the elements of Empedocles are to the elements of Anaxagoras as roots are to seeds. In the cosmogony of Anaxagoras, the Empedoclean elements are indeed a later stage of an evolution, at the beginning of which the true *spermata* are, the true seeds. For the Empedoclean elements are themselves already mixtures of the seeds, mixtures of those ultimate sense qualities.

For a popular presentation, however, the Anaxagorean *spermata* would have been something much too difficult to grasp, whereas even to the man in the street the four elements are forthwith understandable.

It would be wrong to consider the verses of Empedocles mere stammering and babbling, as did Aristotle sometimes. With all their bombast, they are very cunning and shrewd. It is certainly no accident that Empedocles calls his elements "roots," and not "seeds." [3]

[1] See note page 343.
[2] See note page 343.
[3] Cf. also p. 307f. W. Kranz (*Empedokles*, p. 40), following Bignone, points at the "Pythagorean oath" in which there is allegedly the same expression "root of all things" ("*Wurzel von allem*"), his tacit implication being that Empedocles may just have adopted that Pythagorean term. However, when checking that hint, one finds (58 B 15) that the exact wording, as given by Aetios (I 3, 8), is that the Tetraktys (the number Ten) is called "fountain and root of ever-flowing nature" (παγὰν ἀενάου φύσεως ῥίζωμά τ'). This shows that both expressions, "fountain" as well as "root," are here used as rather well-worn, commonplace metaphors. The hint at the "Pythagorean oath," therefore, is of no value for a better understanding of the telling Empedoclean phrase.

That the four Empedoclean elements are no really ultimate constituents of the world, but are themselves composed of those Anaxagorean ultimate "seeds," the various pairs of opposites, each pair corresponding to a different field of sensation, was clearly understood as early as antiquity. In Stobaios (perhaps taken over from Plutarch), after the enumeration and interpretation (quoted above) of the Empedoclean elements, it says:

> Of four elements, then, consists the Whole. The nature of these (sc., the elements), however, is made up of the opposites – (such as) dryness and moistness and warmth and coldness – and by their (sc., the opposites') mutual proportion and mixture (= by their proportionate mixture with each other) it produces the Whole, yet, although undergoing changes in its parts, does not allow a dissolution of the Whole.
>
> ἐκ τεσσάρων οὖν στοιχείων τὸ πᾶν, τῆς τούτων φύσεως ἐξ ἐναντίων συνεστώσης, ξηρότητός τε καὶ ὑγρότητος καὶ θερμότητος καὶ ψυχρότητος, ὑπὸ τῆς πρὸς ἄλληλα ἀναλογίας καὶ κράσεως ἐναπεργαζομένης τὸ πᾶν καὶ μεταβολὰς μὲν μερικὰς ὑπομενούσης, τοῦ δὲ παντὸς λύσιν μὴ ἐπιδεχομένης.
>
> *Alleg. hom. script. in Stob. Ecl. I 10, 11 b p. 121; A 33.*

Incidentally, as has been demonstrated (cf. 194), the Anaxagorean ultimate seeds by their very nature as spatialized qualities require the assumption of their mutual penetration. This idea of genuine mutual penetration seems to have been something at which Empedocles balked, to gather from a remark in Galen:

> The first, of those of whom we know, to declare that the (so-called) elements are mixtures was Hippocrates [1] ... And by that he differed from Empedocles. For he (sc., Emp.), too, says that we as well as all the other bodies all over the earth have taken origin from those same elements from which Hippocrates (derives their origin). Yet (Empedocles says) that (this takes place) not by their being mixed right through each other (i.e., by penetrating each other), but rather by their lying, as to their small particles, side by side and (merely) touching each other.
>
> πρῶτος ὧν ἴσμεν Ἱπποκράτης ἀπεφήνατο κεράννυσθαι τὰ στοιχεῖα . . . καὶ ταύτῃ διήνεγκεν Ἐμπεδοκλέους· κἀκεῖνος γὰρ ἐκ μὲν τῶν αὐτῶν

[1] Galen (130–ca. 210 A.D.) did not realize that not Hippocrates (410–366 B.C.) was the first, but Anaxagoras, if not even Anaximander.

στοιχείων, ὧν καὶ Ἱπποκράτης, γεγονέναι φησὶν ἡμᾶς τε καὶ τὰ ἄλλα σώματα πάντα τὰ περὶ τὴν γῆν, οὐ μὴν κεκραμένων γε δι᾽ ἀλλήλων, ἀλλὰ κατὰ σμικρὰ μόρια παρακειμένων τε καὶ ψαυόντων.

Galen. in Hipp. nat. hom. XV 32 p. 27, 22; A34.

This could not have been otherwise, of course, since Empedocles' ultimate particles are not spatialized qualities, but just tiny particles of air, ether, water, and earth.

As to those ultimate particles, it might not be inappropriate to do away from the very outset with certain misapprehensions. There are those who (as Kranz and others) would take Empedocles for "the ancestor proper of atomism." However, the assumption of any ultimate particles makes neither Empedocles nor Anaxagoras for that matter into atomists. Already Aristotle has pointed out the decisive difference between an ultimate particle that is indivisible – which applies to the Democritean *atomoi* alone – and an ultimate particle that merely remains in fact undivided:

> If disseverance will come to an end, then the body at which it is stopped will either indeed be indivisible or it will be divisible, though, but will just in fact never be divided any more, which is what Empedocles wants to say.
>
> εἰ δὲ στήσεται ἡ διάλυσις, ἤτοι ἄτομον ἔσται τὸ σῶμα ἐν ᾧ ἵσταται ἢ διαιρετὸν μέν, οὐ μέντοι διαιρεθησόμενον οὐδέποτε, καθάπερ Ἐμπεδοκλῆς βούλεται λέγειν.

Arist. de caelo III 6. 305 a1; A43a.

The Problem of Motion

Empedocles has now a plurality of elements instead of the one element from which the Transformists had tried to derive this variegated world. But the plurality as such of elements would not have helped him overcome the difficulties of Transformism. For if he assumes those elements in their stratified distribution: the earth below, the ether above, and the others in between, nothing will move. And motion it is what he is aiming at.

As has been shown, the problem of motion had been one of the pitfalls of Transformism. One could say, of course, the one primordial stuff is a god who just happens to be fond of movement and change. But then this must not be the god of a Hellenic philosopher, but a creator. If God creates the world out of nothing, then He can also make of it whatever He pleases. But here one has to be careful not to

presuppose anything like that. Here the god has not created the world from nothing, but is himself merely the mental side of the stuff. Here, therefore, any movement or change would have to be already predisposed in the stuff, or else it would not occur to the mind to will it. And even supposing that the god, since the stuff, his body, is merely his other side, does make that decision of moving and changing, then, as has been demonstrated (cf. p. 166), it would be of no avail because afterwards there would be again the same everywhere, although of a different quality. If, however, as for instance with Heraclitus, only one half of the god, one half of the divine primordial stuff, is to transform itself – which of the two halves shall it be if everywhere is exactly the same?

Yet, the mere assumption of a plurality would not have sufficed for overcoming those difficulties inherent in any attempt at having a world originate from one, sole primary stuff.

It would be different if Empedocles had assumed an initial chaos of his four elements. Then the chaos would get stratified by itself, and this would already mean some process of world formation. Such process, though, would come to an end eventually, and then the world would be at rest again. But to Empedocles the problem was: How can there be such motion as could be called cosmos, and not chaos?

Therefore, Empedocles had to assume not only a plurality in matter, but also a cleavage in mind. He understood that the whole thing just does not work if there is, e.g., the same Logos everywhere. And so, making philosophical use of the Zoroastrian pattern, he downright dualistically splits the god into two demons and then has the two demons rule over the world alternately.[1] Now it works.

Anaxagoras had still assumed only one ruling principle. This is one more proof that Empedocles is a successor of Anaxagoras. For he is aware of a difficulty that with Anaxagoras is not yet there. His philosophy is logically to be put after the doctrine of Anaxagoras. Again: Empedocles heard Anaxagoras and then merely published earlier.

Thus, in order to avoid an eventual standstill of the world process, Empedocles assumes not one and strictly unique mental principle, but two: Love and Strife, *Philotes* and *Neikos*.

[1] By the same Zoroastrian dualism Heraclitus, not being a natural philosopher basically, had been provoked to the monistic counter-creation of a strictly unique god who only by subsequent self-disunion engenders this world of fight. He did not see the problem Empedocles saw.

These rule over the stuff alternately, and each arranges the world in a different manner. As a consequence of the periodical alternation of rule, there are two contrasting world orders: first a world of love, then a world of strife, and so on and on, again and again, and there can never be a standstill. For all Empedocles has to do is see to it that those demons be not bound to the stuffs eternally, but alternately.

Philotes and Neikos rule alternately over the world, each in a different process, and the terminal point of the one process is always the initial point of the next.

This construction is so cogent that Empedocles could not have done it otherwise, or else he would not have been a philosopher. Only in this way can the world process continue in all eternity. That dualism enables him to keep, in his construction, the stuffs from getting just stratified and then staying at rigid rest for ever.[1]

The problem Empedocles tried to tackle in this way is similar to the problem which has prompted modern physicists to the dreary prophecy of "caloric death" as postulated in the Second Proposition of the Theory of Heat when the so-called entropy of the world will reach its maximum. Only that Empedocles' assumption of two alternating sets of natural law is by far superior in consistency:

Those modern physicists console themselves with the idea that there is still so much time until then that one need not worry about it today. The same physicists, however, would strictly refuse to believe in a Mosaic genesis, a beginning of the world in time, not realizing that exactly this is in fact their implicit presupposition. For otherwise they have an eternity also behind them, and their caloric death, consequently, would have to have already occurred a long time ago ...

[1] When trying their hand at philosophical interpretation, so many philologists show a melancholy helplessness. One more proof of this touching fact is page 348 of Kirk & Raven's *The Presocratic Philosophers*. There the two authors take Empedocles to task for "his introduction of the cosmic cycle" and try in vain to find out what "induced him so to complicate his cosmology with the otherwise arbitrary cycle." "It cannot even be said," they complain, "that the cosmic cycle was unavoidable: it would surely have been a simpler undertaking to describe the emergence from the Sphere of a world in which the two motive forces, Love and Strife, instead of prevailing alternately, reached a stable equilibrium. Why then – and this is another question of central importance for our understanding of Empedocles' system – did he introduce the cosmic cycle at all?" – Yes, indeed, this certainly is a "question of central importance" for an understanding of Empedocles' system ...

Empedocles' World Is Finite

During the rule of the demon Philotes over the world, the demon Neikos is relegated into the Nothing that surrounds the world. There he still *is* something, but does not have, does not possess anything. And during the reign of Neikos, the demon Philotes must retreat into the void Nothing encompassing the world where she (Philotes is feminine!) exists, though, but possesses nothing.

That is why, by the inner necessity of the technique of composition, Empedocles was forced to assume a world of finite size. If the world is to be governed by Love and Hatred alternately, then it just cannot be otherwise. If the two demons, in turns, were to be sent into exile powerless, Empedocles had to take the world as finite, with the void, surrounding Nothing as a metaphysical Siberia.

That Empedocles did realize his world as of finite size is also substantiated by textual evidence. In a fragment handed down by Aristotle, Empedocles haughtily says:

> If indeed the depths of the earth and the copious ether were endless,
> As it has been said through the tongues of many people
> And at random has spilt from the mouths of those
> Who had certainly seen of the Whole very little ...
>
> εἴπερ ἀπείρονα γῆς τε βάθη καὶ δαψιλὸς αἰθήρ,
> ὡς διὰ πολλῶν δὴ γλώσσης ῥηθέντα ματαίως
> ἐκκέχυται στομάτων ὀλίγον τοῦ παντὸς ἰδόντων ...
>
> *fr. 39 (Aristotle, de caelo II 13. 294a25).*

According to Empedocles, then, these are thoughtless utterances of people who are ignorant. This clearly implies that Empedocles himself maintains that "the Whole" is of finite size.

No Void Space in the World

Within this finite world there are no void interstices, and outside the world there is only the void Nothing:

> But similarly (sc., just as Anaxagoras) also Empedocles maintains that ... nothing empty exists, saying that of the Whole nothing is empty. From where, then; should anything supervene when indeed (δέ) it (sc., the Whole) is kept together into one shape so that it is one thing? In no way, he says, it (sc., the Whole) becomes either void or projecting (περισσόν, sc., nothing gets outside the shape).

For what hinders that things (sc., if separated by void space) move to each other . . .?

ὁμοίως δὲ καὶ ὁ Ἐμπεδοκλῆς . . . φησι . . . <κενὸν> οὐδὲν εἶναι, λέγων ὡς τοῦ παντὸς δ' οὐδὲν κενεόν. πόθεν οὖν τί κ' ἐπέλθοι, ὅταν δὲ εἰς μίαν μορφὴν συγκριθῇ, ὥσθ' ἓν εἶναι; οὐδέν, φησί, τό γε κενεὸν πέλει οὐδὲ περισσόν. τί γὰρ κωλύει εἰς ἄλληλα φέρεσθαι . . .; [1]

[Arist.] de Melisso Xenophane Gorgia 976b23ff. (30A5).

This is the rejection of void space even before it has been assumed. Void space is nothing real. If things are separated by void space, they are separated by nothing, and if separated by nothing, they are together. Exactly the same argument will again be produced about twenty-one centuries later, by Descartes.

Void space is indeed merely a notion, no reality. Or, as Descartes has put it: Space is always filled, otherwise it is not at all. It is through some decadence of the power of imagination that we have got used to operating with void space. It obviously is easier to do so because one has to imagine less.

Incidentally, there should be a careful distinction between literally void space and so-called void space. There could be no objection to operating with a so-called void space, a quasi-void space. This, however, would have to be a space filled with something positive, yet penetrable. Such filling with something penetrable, while insignificant physically and chemically, could be of importance psycho-physiologically. But this chain of problems is not yet fully understood even today.[2]

There is, then, no void space within the world, according to Empedocles, and outside the world there is only the void nothing.

In another fragment, after enumerating again the six ultimate constituents of the world, the four elements and the two demons, Empedocles says, emphasizing anew the same tenet:

[1] To arrive at a plausible meaning, I have taken the liberty of making some changes of punctuation in this rendering of an Empedoclean argumentation by the unknown author of the pseudo-Aristotelian writing. How much of it may be literal quotation and how much merely a paraphrase, this is something for philologists to find out. To separate, however, those two lines of obvious quotation from the logical context of the argument and insert them isolated into the Empedoclean fragments as nos. 13 and 14, while the whole context is to be found among the reports on Melissus, is a disservice to the reader.

[2] Cf. A. Stöhr, *Psychologie. Tatsachen, Probleme und Hypothesen.* 2nd ed., Vienna, 1922, p. 43 ff.

Nothing does supervene to these and nothing does vanish. For
If in any part they completely could perish, they would no more exist at all.
What, however, could add to this Whole and from where could it come? And
How could be thorough destruction as nothing is empty of these?

καὶ πρὸς τοῖς οὔτ' ἄρ τέ τι γίνεται οὔτ' ἀπολήγει·
εἴ τι [1] γὰρ ἐφθείροντο διαμπερές, οὐκέτ' ἂν ἦσαν·
τοῦτο δ' ἐπαυξήσειε τὸ πᾶν τί κε καὶ πόθεν ἐλθόν;
πῇ δέ κε κἠξαπόλοιτο, ἐπεὶ τῶνδ' οὐδὲν ἔρημον;

fr. 17, 30–33 (Simpl. phys. 157, 25).

That is to say, from nothing comes nothing and, on the other hand, there is no annihilation, nothing is reduced to nothing.

This is not specifically Empedoclean, but commonly Hellenic. The idea of a creation of the world by a god out of nothing never occurred to the Greeks.

The Periodic World Process

To describe the periods of the world process, one could start from any point of time. We choose that moment when the demon Strife, or Hatred,[2] separated from the elements, is in the empty Nothing around the world, encompassing the finite quantity of the four elements that now are under the sway of Love.

At this time, all particles of air, water, fire (or ether), and earth, parts of the same quality as well as parts of different qualities, are united with each other in equal love, which is to say they have all the same specific gravity.

Such union "by love" is not merely another word for "power of

[1] εἴ τι (instead of εἴτε), first (in: *Poet. Phil. Fr.*) suggested and then dropped by Diels, seems the only version to make sense, τι being an *accusativus relationis:* "as to any bit," "in any part." The usual translations, however, on the basis of εἴτε: "Denn wenn sie fort und fort zugrunde gingen, wären sie nicht mehr" (Diels) or "Denn wenn sie bis zu Ende zugrunde gingen, so wären sie nicht mehr" (Kranz), would impute to Empedocles an empty tautology.

[2] Empedocles' usual contraposition is Love and Strife, *Philotes* and *Neikos.* One would rather expect Love and Hatred, *Philotes* and *Echthos.* But since he often enough speaks himself of "the hatred of strife" (*e.g.*, Νείκεος ἔχθει, "by the hatred of Strife," fr. 17, 8), it may be allowed to call those demons henceforth Love and Hatred, *Philotes* and *Echthos.*

attraction." It rather implies that emotions are the ultimate motives of any movement.

This is highly characteristic. Empedocles, philosopher of nature, but also preacher of a religious reform, does not operate with a Nous or a Logos, but with emotions, with love and hatred. He opens the great group of the voluntarists.

The 'Sphairos' Stage

As a consequence, then, of the rule of Love over the elements, there is a mutual attraction also of heterogeneous elements. Everything is uniting with everything else as much as any possible, heterogeneous elements as well as homogeneous ones. And since, accordingly, there is no difference whatsoever in the mutual attraction of their particles, the result is of necessity the shape of a ball.

Quite a nice idea. It is true indeed that here there cannot be any protuberances, but only something of the shape of a sphere.

> But this Sphairos, as round as a ball, was equal all over, and
> Fully without any limits, enjoying the rest all around.
>
> ἀλλ' ὅ γε πάντοθεν ἶσος <ἔην> [1] καὶ πάμπαν ἀπείρων
> Σφαῖρος κυκλοτερὴς μονίῃ περιηγέι γαίων.

fr. 28 (Stob. Ecl. I 15, 2ab).

Sphairos is here the name of a stage of the periodic change of the world, the name of the condition of thorough, intimate mixture of heterogeneous as well as homogeneous stuffs in consequence of indiscriminately equal mutual attraction.

This fragment contains some startling expressions. What on earth shall here be the meaning of "fully without any limits," πάμπαν ἀπείρων (*pampan apeiron*)? Is that supposed to mean "infinitely large"? Is then the Sphairos an infinitely large ball, and was it wrong to maintain that Empedocles assumed a world of finite size? But here we read also of something "all around," of a surrounding that the Sphairos enjoys. Does infinity have any surroundings? And then it says "fully without any limits," "completely limitless," *pampan apeiron*. Can there be anything completely infinite, and anything else only partly infinite? But this is all just sheer nonsense! An infinitely large Sphairos enjoying the surrounding rest [2] – no, that does not work.

[1] I prefer the Diels version ἔην to the ἐοῖ of Dr. Kranz.
[2] or "the surrounding solitude" for that matter. Both translations, namely, of μονίη have been suggested.

The only meaningful interpretation of *pampan apeiron* is here "completely without limitations, without any borders" – *inside* the Sphairos:

If that ball were stratified into land, sea, air, and sky, then it would have borders within itself. But this sphere is completely without borders, without *peirata*, which is to say, it is completely homogeneous. The elements are so equally and intimately mixed that inside the ball there is no border possible between one body and another body. The meaning, therefore, is not: the Sphairos extends into infinity, but: the Sphairos has no interior articulation.

There is still another difficulty. What is meant by "equal all over," "equal from all sides," πάντοθεν ἶσος (*pantothen isos*)? One could perhaps say of the radii of the sphere that they are equal to each other. But here is something said about the Sphairos, not the radii. The ball itself is supposed to be "equal from all sides." Equal to what? There is not there anything else.

Pantothen isos makes sense only if *isos*, "equal," means "qualitatively equal." The Sphairos, wherever one could take out any part, is of equal quality.

Now the whole picture is clear: a homogeneous ball without interior articulation, surrounded by the empty Nothing.

This is also in keeping with a passage handed down by Plutarch and Simplikios:

> Neither swift limbs of a sun could have been distinguished [1] there
> Nor the rough strength of an earth been looked at nor any ocean:
> So the Sphairos, as round as a ball, was [1] firmly reposing in
> Harmony's intimate secret, enjoying the rest all around.
>
> ἐνθ' οὔτ' ἠελίοιο διείδετο [1] ὠκέα γυῖα
> οὐδὲ μὲν οὐδ' αἴης λάσιον μένος οὐδὲ θάλασσα·
> οὕτως Ἁρμονίης πυκινῷ κρύφῳ ἐστήρικτο [1]
> Σφαῖρος κυκλοτερὴς μονίῃ περιηγέι γαίων.

fr. 27 (Plut. de fac. lun. 12 p. 938D; Simpl. phys. 1183, 28).

"Harmony's intimate secrecy" means, of course, the intimate, penetrating union through Philotes, through Love.

[1] Encouraged by the good example of v. Wilamowitz concerning fr. 29 (cf. p. 354), I have changed, for the sake of better consistency, διείδεται into διείδετο and ἐστήρικται into ἐστήρικτο.

In Sphairos, then, there is nothing but the finest mixture of the elements.

At the same time, however, this is also an intimate mixture of all consciousness. For Empedocles is still a panzoist. (As yet, there are neither materialists nor spiritualists, but only just panzoists.) That is to say, Sphairos is not merely a homogeneous mixture of "matter." It is also the body of a demon, or rather of a goddess, the goddess Philotes.

This goddess is in fact the only deity proper, according to Empedocles. Originally, it is true, Love and Hatred are two demons, and of equal status. But then the impartial natural philosopher Empedocles yields to Empedocles, the religionist and priest, and bestows upon Philotes the rank of a goddess, identifying her with Kypris, with Aphrodite (cf. a.o. fr. 86), in contrast to her foe who then is merely a demon.[1]

When subsequently the whole world will have been conquered by Hatred, the world will be the body of the demon Hatred. But now, in the Sphairos stage, it is the body of Love.

Therefore, when Philotes is also called Aphrodite and Kypris, it does not mean that this deity may be visualized after the manner in which popular religion visualizes Aphrodite: as a divine being of human shape, only much more beautiful than any mortal woman. For this godhead, in this stage of the world process, had the shape of a ball, its body was the Sphairos, the whole world that is, in the condition of indiscriminate homogeneity, and the mind, the consciousness of this deity was but one mighty will, one enormous emotion, throughout all points of the Sphairos body:

> For it (sc., the godhead) was [2] not supplied with a human head on limbs,

[1] Likewise Zoroastrianism, the dualism of the good and the bad principles notwithstanding, maintains a strict monotheism by bestowing divine rank only upon the one of the two principles.

[2] In this fragment as well as in fr. 27 (cf. p. 353), I have changed the tense of the verbs for the same reason as did v. Wilamowitz in fr. 29 where ἀλλὰ σφαῖρος ἔην fully justifies the change (in v. Wilamowitz' personal copy) of the preceding ἀΐσσονται into ἀΐσσοντο. It seems to have been overlooked that also in fr. 134 the third verb ἔπλετο would require the preceding verbs to be κέκαστο (instead of κέκασται) and ἀΐσσοντο (instead of ἀΐσσονται). As is well known, later ancient authors had a tendency toward allegorically interpreting into a simultaneity the genuinely temporal succession of the Empedoclean world process, in analogy with the interpretation of the "cosmogony" in Plato's *Timaeus*. This inclination for εὐγνωμοσύνη (as Simplikios calls it) may have been the source of those inadequate present tense forms in their quotations of the fragments cited above. (Cf. also Simpl. de caelo 141, 10; 304, 4; 305, 10; 530, 15; phys. 1121, 17 and 25; 1186, 30, quoted by Bignone, *l.c.*, p. 589.) – The fragment quoted by Ammonios has been inserted by Diels into the extant relics of the *Katharmoi* as fr. 134. Bignone, however, in a cogent argumentation (*l.c.*, pp. 631–649) has made it plausible that the right place of this and some related fragments is among the remains of *Peri Physeos*. He has also shown that Ammonios' contention (adopted by Dr. Kranz) to the effect that fr. 134 refers to Apollo particularly lacks any real substantiation (*l.c.*, p. 642).

> Not from a back two branches were swinging,[1] nor were coming
> down [2] any
> Feet, no nimble knees were there nor hairy organs,
> But there was a will [3] alone that was strong and enormous,[3]
> Swinging throughout the whole world with nimble considerations.

> οὐδὲ γὰρ ἀνδρομέῃ κεφαλῇ κατὰ γυῖα κέκαστο [1]
> οὐ μὲν ἀπαὶ νώτοιο δύο κλάδοι ἀΐσσοντο [2]
> οὐ πόδες, οὐ θοὰ γοῦν(α), οὐ μήδεα λαχνήεντα,
> ἀλλὰ φρὴν [3] ἱερὴ καὶ ἀθέσφατος [3] ἔπλετο μοῦνον,
> φροντίσι κόσμον ἅπαντα καταΐσσουσα θοῇσιν.

fr. 134 (Ammonios de interpr. 249, 1).

[1] See note 2 page 354.

[2] ἀΐσσεσθαι means, among other things, also "to swing oneself" as well as "to shoot down," "to come down," "to descend." That is why in the translation I had to repeat the verb, and with the appropriate modification.

[3] As to ἀλλὰ φρὴν ἱερὴ καὶ ἀθέσφατος ἔπλετο μοῦνον, it is easily understood that a fifth century A.D. neoplatonistic commentator such as Ammonios took φρὴν ἱερή for something like a *Spiritus sanctus* or even an allusion to the holy "cause beyond Intellect" (διὰ τοῦ "Ἱερή" καὶ τὴν ὑπὲρ νοῦν αἰνιττόμενος αἰτίαν. [He could as well have said ἐπέκεινα νοῦ instead of ὑπὲρ νοῦν . . .]). Yet, the question is whether this is what Empedocles, about a thousand years before Ammonios, wanted to say (provided always, of course, that those last two lines are not spurious). Φρήν need not mean "spirit." One of its basic meanings is also "will" (cf. νόου φρενί in Xenophanes) and "emotion." Which is much more fitting to the godhead Philotes. Ἱερός means only in the second place "holy." In the first place it means "vigorous," "strong," "robust," "fresh," "swift," and ἀθέσφατος does not mean "superhuman," but simply "indescribably large," "enormous." And φροντίς means not only just "thought," but also "loving care." Thus, Philotes not only later on, when whirling between the elements (μετὰ τοῖσιν ἑλισσομένη) and implanted in mortal genitals (θνητοῖσι ἔμφυτος ἄρθροις, cf. fr. 17, vv. 25 and 22), will make the organisms "feel love," φίλα φρονεῖν, but is herself already when still alone full of "loving thoughts" (φροντίδες) throughout. Translations, therefore, such as, "Ein Geist, ein heiliger und unaussprechlicher, regt sich da, der mit schnellen Gedanken den ganzen Weltenbau durchfliegt" (Diels) or, "Ein Geist, ein heiliger und übermenschlicher, regt sich da allein, der mit schnellen Gedanken den ganzen Weltenbau durchstürmt" (Kranz) or, "He is Mind, holy and ineffable, and only Mind, which darts through the whole universe with its swift thoughts" (Freeman), do make sense, though, but hardly a genuinely Empedoclean sense.

Apart from the will and emotion of love, then, which the goddess Philotes herself *is*, the consciousness of Philotes-Sphairos as a result of that intimate, harmonious mixture contains but the sensation of overall pleasure.

This is quite in accordance with the emotional type of the whole thing. That is also why Aristotle calls the Sphairos of Empedocles a happiest god, but less intelligent. This most blissful god indeed knows less and loves more.[1] He knows, namely, himself only, but knows nothing about the beauty of a world differentiating by fight which is only possible through the strife of the elements:

> Therefore it follows for him (sc., Empedocles) also that that most blissful god knows less about everything else: for he knows nothing about all the elements, since in him there is no strife.
>
> διὸ καὶ συμβαίνει αὐτῷ τὸν εὐδαιμονέστατον θεὸν ἧττον φρόνιμον εἶναι τῶν ἄλλων· οὐ γὰρ γνωρίζει τὰ στοιχεῖα πάντα· τὸ γὰρ νεῖκος οὐκ ἔχει . . .
>
> *Arist. Metaph. II 4. 1000b3. (Not mentioned by Diels or Kranz.)*

Thus, Böhme's [2] idea of the unproductivity of happiness can be found already here. From perfect happiness nothing originates since contentedness is no impulse to production. That is why evil is necessary, says Böhme. Also according to Empedocles, the evil demon Hatred is indispensable for the variegation of a world . . .

There is one more description of that sphere of finite size, called Sphairos, a description particularly conspicuous because of its resemblance with, and its deviation from, the alleged Holy Ghost fragment discussed above. It has been handed down by the Christian writer Hippolytus and reads as follows:

> Not from a back two branches were swinging nor were coming down any
> Feet, no nimble knees were there nor engendering organs,
> But it was (just) a ball and like with itself from all sides.
>
> οὐ γὰρ ἀπὸ νώτοιο δύο κλάδοι ἀΐσσονται (cf. p. 354),
> οὐ πόδες, οὐ θοὰ γοῦν(α), οὐ μήδεα γεννήεντα,
> ἀλλὰ σφαῖρος ἔην καὶ <πάντοθεν> ἴσος ἑαυτῷ.
>
> *fr. 29 (Hippol. ref. VII 29).*

[1] Similarly in Lord Byron's "Cain," of the various seraphim the ones know more, the others love more.

[2] Jakob Böhme, the great German mystic (1575–1624).

The first two lines are virtually identical with the second and third lines of fragment 134.

Such repetitions for a different purpose in a different context are not rare in Empedocles, it is true. But in this case there are some points apt to arouse suspicion.

If fragment 29 were to be interpreted as such, in its own right, we should have understood the surprising expression "not two branches" etc. (instead of "two arms") as indicating that the godhead was no vegetable organism; the statement that it had no feet, as indicating that it was no animal organism, either; and that there were no genital organs, that it was no organism of any kind. Above all, however, with regard to the finishing part, "But it was just a ball" etc., we might have translated θοὰ γοῦνα not as "nimble (or swift) knees" which is an empty cliché. Since there are two homonymous adjectives θοός, the one meaning "swift," the other, "pointed," we could have translated θοὰ γοῦνα as "pointed knees" which very plastically would have emphasized that nothing pointed was on the Sphairos "as round as a ball" (κυκλοτερής).

Fragment 134, however, would render this meaningful interpretation impossible since in it θοαὶ φροντίδες are mentioned which, of course, cannot mean "pointed thoughts." Consequently, the θοὰ γοῦνα in this fragment cannot be "pointed knees," either. That, however, θοὰ γοῦνα should have meant to Empedocles "pointed knees" in one place and "swift knees" in another place is extremely improbable.

It is easily understood that one is reluctant to give up a significant interpretation in favor of a cliché.

But in addition and at the top of all that, there is the puzzling question: Why does the Christian writer Hippolytus nowhere, as far as I know, mention this wonderful Holy Ghost fragment?

It seems to have popped up for the first time, a thousand years after Empedocles, in the Aristotle commentary of Ammonios, and nowhere else. Should, then, perhaps, not the interpretation of the fragment, but the fragment itself, or rather its last two lines, be a pious "invention" of either neoplatonistic or Christian origin?

I do not dare answer this question. But that the question is not quite groundless can hardly be denied.

The 'Akreta-Zora' Stage

The Sphairos stage, the condition in which the world globe is possessed and ruled by Love, cannot last. Nor can the exile of Hatred.

For in all eternity recurrent is the alternation of the rule of the two demons. This is the fundamental law, the fate, the *aisa* (αἶσα), of the world, fixed "by a broad oath" (πλατέος παρ' ὅρκου, cf. fr. 30).

When his time has come, the demon Hatred begins to recapture the world.

The world process thus engendered goes on in such a way that within Sphairos ever more and more particles are abandoned by the love for each other of heterogeneous elements, to be seized instead by the mutual hatred of heterogeneous elements. The particles hating each other become severed.

As a consequence, the equal filling of the Sphairos gradually ceases, and there arise boundaries between the elements within the sphere that, accordingly, cannot be called any more *pampan apeiron*, "completely without limits."

In his fight to reconquer the world, the demon Hatred does not advance symmetrically. He makes his inroads irregularly, now here, now there. He must always start from outside, of course. But he can establish bridgeheads, as it were, at some spots, and from there, along certain radii, with greater speed dash inwards. Therefore, although entering from outside, he need not penetrate uniformly and symmetrically. (All these early philosophers, the Eleatics alone excepted, think in plastic images.)

Thus it happens that the demon Hatred does not seize the sum total of the elements simultaneously and suddenly, but gradually and slowly. Why does Empedocles construct it in this way? – Because otherwise any movement would come to an end in no time. There would then merely be a sudden succession of conditions, but no process. Empedocles, however, does want to get a world process. That is why he has assumed those two demons. And that is also why that penetration of Hatred into the world must be gradual. This is just a requirement of the technique of philosophical construction. Ether, earth, water, and air withdraw, as it were, from each other within the sphere slowly.

According to Aetios, Empedocles has indicated a certain sequence in the severance of the elements within the homogeneous Sphairos mixture:

> According to Empedocles, the first to be severed was the ether, the second, fire, thereafter the earth, out of which, strongly swinging around by the pull of rotation, sprang forth the water, and from this evaporated the air. And the heaven originated from the ether, the sun from the fire, and from the rest were condensed the things on earth.[1]

> Ἐμπεδοκλῆς τὸν μὲν αἰθέρα πρῶτον διακριθῆναι, δεύτερον δὲ τὸ πῦρ, ἐφ' ᾧ τὴν γῆν, ἐξ ἧς ἄγαν περισφιγγομένης τῇ ῥύμῃ τῆς περιφορᾶς ἀναβλύσαι τὸ ὕδωρ· ἐξ οὗ θυμιαθῆναι τὸν ἀέρα, καὶ γενέσθαι τὸν μὲν οὐρανὸν ἐκ τοῦ αἰθέρος, τὸν δὲ ἥλιον ἐκ τοῦ πυρός, πιληθῆναι δὲ ἐκ τῶν ἄλλων τὰ περίγεια.
>
> *Aet. II 6, 3; A49.*

The mutual repulsion of the different elements benefits the attraction of the particles of the same elements. Love between like, namely, never ceases. Thus, while the particles of like elements remain in their mutual attraction, each element by way of separation from the other elements gives the impression of growing. Not that particles of the same element would meet. They always stay together anyway. It is merely a decreasing union that looks like growth:

> Fire grows by fire,
> Earth enlarges its own shape, and ether increases the ether.
>
> πυρὶ γὰρ αὔξει τὸ πῦρ,
> αὔξει δὲ χθὼν μὲν σφέτερον δέμας, αἰθέρα δ' αἰθήρ.
>
> *fr. 37 (Arist. de gen. et corr. II 6. 333a35).*

When the elements have been completely severed from each other and so have been completely purified, they have arrived again at perfect rest. Such a purified element is then totally unmixed and therefore strong, in the same sense in which unmixed wine is called strong, as contrasted to diluted wine. When mixed with water, wine is not so strong as pure wine. And Empedocles calls indeed such purified elements "strong" (ζῶρα, *zora*) and "unmixed" (ἄκρητα, *akreta*).[2]

The condition of the world when all the elements have been completely severed from each other is the opposite of the Sphairos stage. The world is still a sphere, but not without borders any more, not *pampan apeiron*. Now there are boundaries within the world sphere. Nor is the sphere in all its parts of the same quality, *pantothen isos*, any longer.

[1] This passage sounds as if Empedocles had assumed five elements. But one gets the number four again by taking ether and fire as differences in temperature of the same.

[2] Cf. fr. 35, 15. (The Diels-Kranz-Freeman translation of the line is unsatisfactory, see p. 363.)

This other stage, opposite to the Sphairos stage, can fittingly be called the stage of the *Akreta Zora*.

Between these two extreme stages the world is going to and fro in all eternity. For after the Akreta-Zora stage the world process will turn again back toward Sphairos.

Empedocles, in all probability, has allotted a duration of some length also to the absolute rule of each demon. The terminal point of the one phase would then not actually coincide with the initial point of the next, in a strictly oscillating, two-phases world process, and our outline of the alternation pattern of Empedocles' basic world view (cf. p. 348) would have to be modified accordingly: it is a succession, beginningless and endless, not of two, but four phases, of which two are phases of perfect rest.

The Rise of Organisms

The world is now entirely devoid of love, hence also entirely devoid of life. For life means union of unlike elements.

Strictly speaking, there had been in the whole world process as described thus far no possibility of any life, apart from the life of the Sphairos as a whole which, of course, had been life even of a high degree, with all that happiness and pleasure. But in the Sphairos there had been no life in the sense of a plurality of individual living organisms.

Yet, what about that period of fight of the invading Hatred with Philotes defending in vain her dwindling power? Was the formation of organisms possible sometime during this phase?

There was a controversy among philologists concerning this question. Famous names were among those contending such possibility as well as among those contesting it. It appears more plausible, however, that the formation step by step of those complicated buildings, called organisms, would have been highly improbable in a process of ever increasing severance and disintegration, delayed merely by an ever more fading power of union. And since all those Empedoclean fragments adduced as evidence for the one proposition have in fact been claimed also as evidence corroborating the opposite proposition, it would seem that those are right who have answered that question in the negative.

And now the process turns around and becomes retrograde from the stage of the strictly severed elements back toward the Sphairos stage. Love penetrates into the world: the hatred of unlike elements begins to be dislodged and supplanted by the love of unlike elements.

Given the masses of the four elements, separated, stratified, as due to the victory and unrestricted rule of Hatred during the Akreta-Zora phase – where can the invading Love take effect first?

Tentatively, the answer could be: on the surface of the earth. For apparently here alone a union of earth and water and air with the fire coming from the sun, and thus also a formation of living things, of organisms, would be possible.

For this reason, it would seem that Love could enter only at and along the border between the two world hemispheres, in that horizontal section through the world sphere which Empedocles calls "the middle," in the same sense as one speaks of "the middle," or "the waist," of a body. For below the earth surface, within the earth hemisphere, no origination of organisms is possible since here there is no air nor light. And in the upper hemisphere, so it should seem, it is likewise impossible since earth and water are lacking there. The rule of Love, therefore, would begin in the border plane between the two hemispheres because in that horizontal section alone a meeting of all the four elements is feasible.

(The conjecture that, according to Empedocles, the rule of Love might begin in the border plane between the two hemispheres will turn out to be wrong. But for reasons of the technique of presentation, we want to let it pass for the time being.)

When Strife has arrived at the undermost depth of rotation,
And when Love has come to the middle part of the whirl,
Then in her (sc., Philotes) all these (sc., the elements) unite to become only one,
Yet not at once, but gath'ring now here, now there, to their liking.
When these were mingling, numberless hosts of mortals flew forth.
Yet, many did not mix with those from all sides intermixing:
All those still kept by the puffed up Strife.[1] For not completely
Did as a whole it leave them and go to the outermost circle,
But still partly remained inside the limbs, partly had left them.
Yet
Always as far as it dashed outside, just as far all the time would
Friendly, divine assault of faultless Love rush ahead.

[1] To refer μετάρσιον (sing.) to ὅσσα (plur.) and translate "soviel der Streit noch davon in der Schwebe hielt" (Diels) is grammatically impossible, apart from the fact that it does not make sense. Dr. Kranz' change into "soviel noch der Streit zurückhielt in der Schwebe befindlich" is an unsuccessful attempt to make the blunder less conspicuous by blurring the construction. Nothing doing: μετάρσιον is an epitheton to Νεῖκος.

ἐπεὶ Νεῖκος μὲν ἐνέρτατον ἵκετο βένθος
δίνης, ἐν δὲ μέσῃ Φιλότης στροφάλιγγι γένηται,
ἐν τῇ δὴ τάδε πάντα συνέρχεται ἓν μόνον εἶναι,
οὐκ ἄφαρ, ἀλλὰ θελημὰ συνιστάμεν᾽ ἄλλοθεν ἄλλα.
τῶν δέ τε μισγομένων χεῖτ᾽ ἔθνεα μυρία θνητῶν·
πολλὰ δ᾽ ἄμεικτ᾽ ἔστηκε κεραιομένοισιν ἐναλλάξ,
ὅσσ᾽ ἔτι Νεῖκος ἔρυκε μετάρσιον·[1] οὐ γὰρ ἀμεμφέως
τῶν πᾶν ἐξέστηκεν ἐπ᾽ ἔσχατα τέρματα κύκλου,
ἀλλὰ τὰ μέν τ᾽ ἐνέμιμνε μελέων τὰ δέ τ᾽ ἐξεβεβήκει.
ὅσσον δ᾽ αἰὲν ὑπεκπροθέοι, τόσον αἰὲν ἐπῄει
ἠπιόφρων Φιλότητος ἀμεμφέος ἄμβροτος ὁρμή·

We interrupt quotation of this fragment (it is fr. 35) to do some commenting.

"Not at once" and "not as a whole" is Hatred chased out, it says, but slowly. Not uniformly does Hatred retire, just as it had not come in uniformly. We know already the reason. The union of unlike elements must not take place at once and completely, since otherwise Sphairos would be back again forthwith, and there would not be any origination of organisms. There must be that slow process, and the life of the organisms is then merely the initial phase of the invasion of Love.

In all that, incidentally, one has to keep in mind that also with Empedocles the origin of organisms does not mean a primordial generation, a *generatio spontanea*, of the living from the lifeless. Here whatever exists is living. Only, there are times when that living has organs, and times when it has no organs, the organisms being the organs of the only living that there is.

There arise, then, organisms in the horizontal section between the two hemispheres. For here alone is a meeting of all the four elements possible. Anywhere else there is still for a long while either pure ether or pure air or pure water or pure earth. In other words, below, inside the earth hemisphere, Hatred is still ruling. And so it is above – one would expect. However, there is here one strange thing: Empedocles expressly says that Hatred, when forced to retire, arrives finally "at the undermost depth of rotation." That means, this demon will ultimately leave from the lower pole of the world sphere. But why not symmetrically, from the upper pole as well as from the lower?

The answer has to be postponed for a while.

[1] See note page 361.

The living, then, does not originate from the lifeless since everything is living. But unmixed living becomes mixed living. Through unlike elements seized by love of each other and therefore uniting, organisms take origin.

Yet, when the origination of an organism is finished, this intricate and complicated building is not a stiff and stable thing. It is rather a continuous process of metabolism, a process of particles entering and leaving and so ever changing their unions with each other, or, to put it the way Empedocles himself describes the fact of metabolism: of particles "exchanging the paths" of existence. The rest of the fragment quoted above reads:

> Quickly things turned mortal that used to be immortal before,[1]
> And what before had been strong and unmixed, (sc., turned into
> things) exchanging the paths.
> When these were mingling, numberless hosts of mortals flew forth,
> Joined into all kinds of shape, a marvel indeed to behold.

αἶψα δὲ θνήτ᾽ ἐφύοντο, τὰ πρὶν μάθον ἀθάνατ᾽ εἶναι,
ζωρά τε τὰ πρὶν ἄκρητα (s., ἐφύοντο) διαλλάξαντα κελεύθους.
τῶν δέ τε μισγομένων χεῖτ᾽ ἔθνεα μυρία θνητῶν,
παντοίαις ἰδέῃσιν ἀρηρότα, θαῦμα ἰδέσθαι.

fr. 35 (Simpl. de caelo 528, 30, a.o.).

An Ingenious Idea

The assumption of a *generatio spontanea*, a primary generation, of organisms directly out of the various component stuffs – an assumption called in modern times "a risky venture of reason" (Kant) – was for the ancients a matter of course.

But Empedocles seems to have been the first of them to become alive to the difficulty proper, implied in the supposition that the complicated organization of a whole organism should have arisen directly from unorganized, though living stuffs. The way he overcame this difficulty is indeed ingenious. Apart from the still naive details, as due to the fact that, although a medical practitioner, Empedocles could, of course, not yet have our modern biological knowledge, his suggestion is

[1] Pure air, pure water, pure earth, pure fire had been immortal, without becoming or perishing. But then, due to their union, organisms originate from them that are mortal in that the various particles of which they are composed are steadily exchanging their paths of existence by entering and leaving now this, now that organism. ("Exchanging the paths of life," incidentally, very much reminds of Indian phraseology.)

even today very worthwhile heeding. It is in fact the only promising approach to the problem.

To put in modern terms what Empedocles has done, his suggestion is: to dissolve the huge problem of the self-origination of a whole organism into a series of successive primordial generations of formations in between, with the more complicated proceeding from the less complicated by accidental symbiosis and subsequent selection. When indeed nowadays has been constructed a separate origination of cellular nucleus and of cytoplasm that afterwards meet by way of symbiosis, and when even the cytoplasm is taken as something that itself, in turn, would have gathered step by step from biomolecules,[1] it is nothing but the idea of Empedocles, strictly speaking. He was the first to show, though in a primitive manner, how the problem of *generatio spontanea* has to be handled.

According to Empedocles, the first and simplest living things to originate from the union, on the surface of the earth, of the four elements were formations in which not yet any differentiation into limbs, sexes, and the like would have been distinguishable. For, obviously, these formations were each a different, but, so to speak, homogenized mixture of the four elements, so that any part had the same qualities as the whole, or as any other part for that matter. Appropriately, therefore, these first and simplest formations Empedocles calls "whole-growns," οὐλοφυεῖς (*oulophyeis*):

> Whole-grown formations were the first things to shoot up from the soil that
> Also had their share of water as well as of heat, for the
> Fire striving to reach its like was pushing them upwards.
> These did not yet display any graceful shape of limbs
> Or any voice or genital parts as is proper with humans.

> οὐλοφυεῖς μὲν πρῶτα τύποι χθονὸς ἐξανέτελλον,
> ἀμφοτέρων ὕδατός τε καὶ ἴδεος αἶσαν ἔχοντες·
> τοὺς μὲν πῦρ ἀνέπεμπε θέλον πρὸς ὅμοιον ἱκέσθαι,
> οὔτε τί πω μελέων ἐρατὸν δέμας ἐμφαίνοντας
> οὔτ' ἐνοπὴν οἷόν τ' ἐπιχώριον ἀνδράσι γυῖον.

fr. 62 (Simpl. phys. 381, 29).

[1] In modern times, Adolf Stöhr has demonstrated how such a system of successive primordial generations, starting from the generation of molecules, could be constructed. (*Der Begriff des Lebens*, Heidelberg, 1909, pp. 96–102.)

The usual translation and interpretation of this fragment is rather different. Diels translates, "Zuerst tauchten rohgeballte Erdklumpen auf," without lexicographical justification rendering οὐλοφυεῖς as *rohgeballt*, taking the genetive χθονός as dependent on τύποι (instead of on the ἐξ in ἐξανέτελλον) and then translating τύποι χθονός as *Erdklumpen*, thus bestowing on τύπος the new meaning of *Klumpen*. Dr. Kranz, correctly reducing the *Klumpen* to *Formen*, seems to have become also somewhat suspicious as to the construction and, in order to play safe, tries to glide over the difficulty by giving χθονός the role of something like an ἀπὸ κοινοῦ when translating, "Rohgeballte Formen *von Erde* tauchten zuerst *aus ihr* auf."

Those first, primitive individual living beings consist not of earth, but of all the four elements. That one of their ingredients is earth is a matter of course, even though grammatically the genetive χθονός is only dependent on the ἐξ-prefix of the verb. That they contain also water and fire ("heat") is explicitly emphasized by Empedocles. And that in the interstices between the particles there is air is again a matter of course and therefore not expressly mentioned. One of these ingredients, the heat, or "fire," is, according to Empedocles, the force driving that thing upwards since the heat having come from the sun has the urge to return upwards to the sun again.

As to οὐλοφυής, there is no justification of taking it for *rohgeballt*. Aristotle, not quite ready to appreciate the proper intention of Empedocles, too hastily equates οὐλοφυεῖς τύποι simply with "seed," or *sperma*, because, as he says,

> of necessity first must the sperma come into existence, not the living beings immediately, and therefore this "οὐλοφυὲς μὲν πρῶτα" was just sperma.

> ἔτι ἀνάγκη σπέρμα γενέσθαι πρῶτον, ἀλλὰ μὴ εὐθὺς τὰ ζῷα, καὶ τὸ "οὐλοφυὲς μὲν πρῶτα" σπέρμα ἦν.

Arist. Phys. II 8. 199b7.

Simplikios, however, commenting on this Aristotle passage, gives at any rate a plausible explanation of the meaning of οὐλοφυής:

> "Whole-grown," namely, is in the first place that which in all its parts completely is whatever it is, since not yet any differentiation has taken place in it. For every part of the sperma is all the parts of the (future) body, whereas no part of the body is all the other parts, because then already differentiation has occurred within

them (sc., the parts) and the "whole-grown" has already been split asunder.

οὐλοφυὲς γὰρ ἐκεῖνο κυρίως ἐστίν, ὃ καθ' ὅλον ἑαυτὸ πᾶν ἐστιν, ὅπερ οὖν ἐστι, μήπω γενομένης ἐν αὐτῷ διακρίσεως. πᾶν χὰρ μέρος τοῦ σπέρματος τὰ πάντα τοῦ σώματος μόριά ἐστιν, οὐδὲν δὲ τοῦ σώματος μέρος ἐστὶ τὰ ἄλλα μέρη διακρίσεως ἤδη γενομένης ἐν αὐτοῖς καὶ διασπασθέντος τοῦ οὐλοφυοῦς.

Simpl. phys. 382, 17. (The second sentence is not quoted either by Diels or Kranz.)

The next step, however, is not, as one could be led to surmise by that remark of Simplikios, a "splitting asunder" of the "whole-growns," in the sense of differentiation. In accordance with the slowly increasing strength of Philotes, the next step is a new union: *a union of the various "whole-growns"* (each of which is a different, onefold tissue, as it were) *into single, individual organs*, such as hands, arms, shoulders, eyes, foreheads, and the like. But although Philotes imbued these single organs with a desire for union with each other, they were for quite a while not able to unite because Hatred was still strong enough to keep them asunder:

There sprang forth many cheeks that did not have any necks,
Naked arms (*i.e.*, without hands) were roaming about without any shoulders, and
Lonely eyes were rambling about in need of their foreheads.

ᾗ πολλαὶ μὲν κόρσαι ἀναύχενες ἐβλάστησαν,
γυμνοὶ δ' ἐπλάζοντο βραχίονες εὔνιδες ὤμων,
ὄμματά τ' οἶ(α) ἐπλανᾶτο πενητεύοντα μετώπων.

fr. 57 (Simpl. de caelo 586, 29; Arist. de caelo III 2. 300b25).

And here belongs Simplikios' comment:

In that condition, the limbs, *still being single due to the severance by Strife*, were roving about, craving for their mating with each other.

ἐν ταύτῃ οὖν καταστάσει μουνομελῆ ἔτι τὰ γυῖα ἀπὸ τῆς τοῦ Νείκους διακρίσεως ὄντα ἐπλανᾶτο τῆς πρὸς ἄλληλα μίξεως ἐφιέμενα.

ad fr. 58 (Simpl. de caelo 587, 18).

Yet, *the strength of Love is increasing* ever more and more, and the demon Hatred is then not able any longer to keep those single limbs from uniting, although that demon will still be strong enough for a very

long while to keep the many organisms, resulting from that union, from coalescing, together with everything else, into the one, all-embracing Sphairos. And so, through the *indiscriminate union* of single limbs, "joined into all kinds of shape, a marvel indeed to behold," *whole organisms* arose finally, deformities as well as "normal" ones:

When, however, the demons came more with each other to grips,
Then these single limbs fell together wherever they met,
And many others more were sprouting forth all the time.

αὐτὰρ ἐπεὶ κατὰ μεῖζον ἐμίσγετο δαίμονι δαίμων,
ταῦτά τε συμπίπτεσκον, ὅπῃ συνέκυρσεν ἕκαστα,
ἄλλα τε πρὸς τοῖς πολλὰ διηνεκῆ ἐξεγένοντο.

fr. 59 (Simpl. de caelo 587, 20).

Many with faces and chests behind and in front grew there,
Creatures, cattle behind and men in front and, inversely,
Bodies of men with heads of oxen, mongrel mixtures of
Male shape here, of feminine there, with genitals shaded.[1]

πολλὰ μὲν ἀμφιπρόσωπα καὶ ἀμφίστερνα φύεσθαι,
βουγενῆ ἀνδρόπρῳρα, τὰ δ' ἔμπαλιν ἐξανατέλλειν
ἀνδροφυῆ βούκρανα, μεμειγμένα τῇ μὲν ἀπ' ἀνδρῶν
τῇ δὲ γυναικοφυῆ, σκιεροῖς ἠσκημένα γυίοις.[1]

fr. 61 (Aelian. Nat. anim. XVI 29; Simpl. phys. 371, 33; Arist. Phys. II 7. 198b29).

But only those survived in which the various organs turned out to be fit "to satisfy their mutual needs," (διὰ τὸ ἀλλήλοις ἐκπληροῦν τὴν χρείαν), as Simplikios puts it (phys. 371, 33; cf. also Aristotle *l.c.*). The others perished. That is to say, accidental symbiosis, perishing of the unfit, survival of the fitted: the first hypothesis of selection.

[1] As to their contents, the quoted fragments constitute a sequence beginning with fr. 62. The fact that Simplikios in the sentence introducing fr. 62 remarks that these verses were "in the second part of the Physics" (ἐν τῷ δευτέρῳ τῶν Φυσικῶν) has been interpreted (by Bignone, *e.g.*) as a proof that here allegedly is described a zoogony different and apart from the other one and indicative of a formation of organisms also during the way from Sphairos to Akreta-Zora. This argument is not cogent. It would imply that the other fragments dealing with this topic were contained in the first part of the writing. This, however, is nowhere said. That remark by Simplikios could as well indicate that fr. 62 was the very first in that sequence, and that the others were likewise contained in the second part of *Peri Physeos*.

The Phenomenon of Death

Yet, those surviving and then multiplying organisms, are not to survive for ever. For that see-saw battle between Love and Hatred is still raging.

Love, it is true, has achieved the union into the well arranged unity, or cosmos, of whole organisms finally (ἄλλοτε μὲν Φιλότητι συνερχόμεν' εἰς ἕνα κόσμον [fr. 26, v. 5]). But Hatred, by its power of disseverance, is still able to inflict upon the organisms as well as all the other things [1] a ceaseless loss in the form of incessant effluences of tiny particles (ἄλλοτε δ' αὖ δίχ' ἕκαστα φορούμενα Νείκεος ἔχθει [*l.c.*, v. 6]), which then Love has to bring back into the morphological unity of an organism. Thus the phenomenon of metabolism, the incessant mutual exchange of the "paths" of these tiny particles now leaving, now entering an organism (ἀλλάσσοντα [sc., κελεύθους] διαμπερές, [*l.c.*, v. 11]), is but an effect of that battle.

But, although the power of Love is slowly increasing ever more and more – so that perhaps also the lifespan of the organisms is slowly growing larger in the long run –, the power of Hatred is still great enough to accomplish in each instance finally the complete "severance of the ethereal, the aerial, the liquid, and the earthlike, of which the body's mass is composed," [2] in other words, the death of the body.

When, however, in some far distant future the time will be due (τελειομένοιο χρόνοιο [fr. 30, v. 2]), and the power of Love will have grown strong enough for a completely unrestricted victory over Hatred, then also death will be abolished.

Yet, – quite different from the Zoroastrian vision about that blissful future after the "end of history," – mankind will then *not* be "not-aging, not-dying, not-decaying, not-rotting, ever living, ever florishing." *For then there will be not only no death any more, but also no mankind nor a plurality of any organisms.* All individual living beings will then have "gone under" again (ὑπένερθε γένηται) in their fusion into the all-embracing, but also all-effacing unity of the Sphairos by dint of the victory of Love (εἰσόκεν ἓν συμφύντα τὸ πᾶν ὑπένερθε γένηται [fr. 26, v. 7]).

[1] Cf. fr. 89 and Plutarch's remark of comment (quaest. nat. 19, 916 D).

[2] Ἐμπεδοκλῆς τὸν θάνατον γίγνεσθαι διαχωρισμῷ τοῦ πυρώδους <καὶ ἀερώδους καὶ ὑδατώδους καὶ γεώδους>, ἐξ ὧν ἡ σύγκρισις τῷ ἀνθρώπῳ συνεστάθη.
Aet. V 25, 4; A 85.

Physiological Psychology

There is not yet any notion of a "matter without consciousness" in Empedocles. The notion of *atomoi apatheis* (ἄτομοι ἀπαθεῖς), of "atoms without feeling," will be formed later on, by the Atomists. With Empedocles, there is still the panzoistic conviction that body and consciousness are merely two sides of the same:

Do not forget, all things have mind and a share in cognition,

πάντα γὰρ ἴσθι φρόνησιν ἔχειν καὶ νώματος αἶσαν,

fr. 110, 10 (Sext. adv. math. VIII 286).

says Empedocles to his favorite disciple Pausanias.

The elements, therefore, are not pure "matter" to him. Each of them is also a carrier of consciousness, or, as Aristotle renders Empedocles' view, formulating it in his own, later terminology:

Each of these (sc., the elements) is also a psyche.

. . . εἶναι δὲ καὶ ἕκαστον ψυχὴν τούτων.

Arist. de anima I 2. 404b8.

Perception of Like by Like

The consciousness of the organisms, consequently, is conditional upon the consciousness of their ingredients, for

Out of these they all have been firmly joined together
And by these they are thinking and feeling enjoyment and grief.

ἐκ τούτων <γὰρ> πάντα πεπήγασιν ἁρμοσθέντα
καὶ τούτοις φρονέουσι καὶ ἥδοντ' ἠδ' ἀνιῶνται.

fr. 107 (Theophr. de sensu 10).

For we perceive the earth by earth, and water by water,
Luminous (δῖον) ether by ether, destructive fire by fire,
Tender love by love, but strife by deplorable strife.

γαίῃ μὲν γὰρ γαῖαν ὀπώπαμεν, ὕδατι δ' ὕδωρ,
αἰθέρι δ' αἰθέρα δῖον, ἀτὰρ πυρὶ πῦρ ἀίδηλον,
στοργὴν δὲ στοργῇ, νεῖκος δέ τε νείκεϊ λυγρῷ.

fr. 109 (Arist. de anima I 2. 404b8).

Aristotle, when quoting these verses again in his Metaphysics (II 4. 1000b5), summarizes their contents in the formula "cognition of like by like" (γνῶσις τοῦ ὁμοίου τῷ ὁμοίῳ).

Empedocles' "perception of like by like" has then been pitted by Theophrastus against the Anaxagorean "perception through contrasts." As already pointed out (cf. p. 261 n. 1), this contraposition is not quite justified. True, Anaxagoras calls attention to the fact that, *e.g.*, only a warm hand feels the coldness of the water. But these contrasts are always restricted to the same element, the same pair of opposites. Never has Anaxagoras taught that by the warmth of a hand the brightness of a color is felt. That is to say, cognition of like by like is the underlying principle also for Anaxagoras, exactly as for his unfaithful disciple Empedocles. Only that Anaxagoras makes, in addition, the fine observation that within each element, within each pair of opposites, the ultimate condition for sensation is the contrast. On the other hand, however, this Anaxagorean perception through contrasts has also been adopted by Empedocles, as will be manifest in his explanation of the causes of the differences between day-seers, night-seers, and twilight-seers among animals (see p. 376).

By the earth, then, contained in our body, we perceive the earth outside our body, etc. And by Love that has seized us, we feel the love of the elements, and of other organisms, outside us, and by our "deplorable strife" we feel the strife of the elements and organisms outside. Thus like is only felt by like. Each element cognizes only itself, and each driving force likewise cognizes itself only. In other words, consciousness is taken as a function bound to the four elements and the two demons.

All the rest follows therefrom automatically. For it is then merely a matter of course that the quality of consciousness depends on the hazard of the mixture of the elements in our body and of the "mixture," the relative strength, of the demons within us:

> By this will of chance, indeed, all things have their mind.
>
> τῇδε μὲν οὖν ἰότητι τύχης πεφρόνηκεν ἅπαντα.
>
> *fr. 103 (Simpl. phys. 331, 10).*

This line has been interpreted as if its meaning were that it be a matter of hazard that everything has consciousness. But the obvious meaning is rather: The quality of consciousness is conditional upon the mixture, and the mixture rests on hazard. The quality of the individual consciousness corresponds to the hazard of the mixture in the individual body.

Sometimes it is even alleged that the meaning of that verse is: consciousness was created by hazard. This, too, appears to be wrong. Consciousness is here not created at all. The existence of consciousness is here presupposed as an eternal function of the eternal elements and demons.

When like *meets* like, there is sensation. When like *rests* in union with like, there is no sensation, but merely the capability of sensation.

That is also why the Sphairos senses so little. This "happiest god" is, of course, full of love. Love, namely, and hatred, respectively, are always felt. For they are no elements, but something that seizes the elements. Hence Sphairos-Philotes feels only love, and Neikos only hatred. And when we now feel love or hatred, it does not mean that love "touches" love, or hatred "touches" hatred. It means rather that we are able to understand love and hatred, to conceive of love and hatred, because we have them within ourselves, being mixtures of love and hatred, in the sense of ourselves being in the grip of the two demons. Thus, there is in this respect some difference in Empedocles between demon and element.

Consciousness, therefore, is ascribed by Empedocles also to the plants. As already mentioned (cf. p. 285), all the Agenetists, Anaxagoras, Empedocles, and also Democritus, ascribe sensation to the plants. This "modern" idea (as pronounced in Fechner's book *Nanna*, published in 1848) is quite ancient. With the Agenetists it is obvious: Each element feels the same element wherever such contacts are possible.

The quality of any consciousness, then, depends on the mixture of the elements. Accordingly, the growth of mind is concomitant to the growth of the body – when man grows bodily, his intellect grows, too –, and to any change in the nature of the body corresponds also a mental change:

> Intellect grows in man according to what there is present.[1]
>
> πρὸς παρεὸν γὰρ μῆτις ἀέξεται ἀνθρώποισιν.
>
> *fr. 106 (Arist. de anima III 3. 427a23; Metaph. III 5. 1009b18).*

And:

> Always as much as their nature has changed, that much they are also
> Seized with the thinking of different thoughts ...

[1] meaning: in relation to what is on hand in stock and mixture of the elements.

ὅσσον <γ'> ἀλλοῖοι μετέφυν, τόσον ἄρ σφισιν αἰεί
καὶ τὸ φρονεῖν ἀλλοῖα παρίσταται . . .

fr. 108 (Arist. Metaph. III 5. 1009b20).

This latter statement is particularly amazing, considering that Empedocles did certainly not yet know anything about hormones, inner secretion, the changing of personality by influencing the function of certain glands, and the like.

Aristotle, in his introductory remark, correctly paraphrases these verses by simply saying that, according to Empedocles, "those undergoing a change in their bodily constitution are changed also in their thinking" (μεταβάλλοντες τὴν ἕξιν μεταβάλλειν φησὶ τὴν φρόνησιν). But this idea seems to have been too difficult to grasp for some of the late ancient commentators. Philoponus (sixth century A.D.) and, perhaps following him, Simplikios conjectured that by that sentence Empedocles might have meant to derive "the nightly fantasies from the activities during the day" (ὅτι ἐκ τῶν καθ' ἡμέραν ἐνεργημάτων αἱ νυκτεριναὶ γίνονται φαντασίαι. Philop. 486, 13).

Modern philologists who were likewise at a loss to understand what exactly Empedocles might have meant, have taken the Philoponus-Simplikios conjecture for a factual statement. And so it has come to pass that that fragment has been rendered as follows:

> Nach dem Maasse, wie sich die Menschen (am Tage überhaupt) ändern, so fällt es ihnen (nachts) bei, auch ihre Gedanken zu ändern. (Diels)

Or:

> Nach dem Maasse, wie sich die Menschen (am Tage) in ihrer Natur änderten, so fällt es ihnen auch stets bei, ihre Gedanken zu ändern (in der Nacht). (Kranz)

Or:

> Insofar as their natures have changed (during the day), so does it befall men to think changed thoughts (in their dreams). (Freeman)

It seems doubtful whether Empedocles himself in such "translations" would recognize his own meaningful idea, or any meaning for that matter . . .

Theory of Vision

On the basis of the principle that like is felt by like only, arise Empedocles' theories of vision, hearing, and smelling.

From all things tiny effluences are proceeding in all directions, hence also toward the eye. But there are proceeding certain effluences also from the eye. These, however, go only in one direction.

When the effluences from the eye meet the effluences from the objects, there is vision. They meet somewhere between the object and the eye, and this meeting is the physiological prerequisite to seeing, whereas the reactions upon what is being seen are made possible through percussions conducted back into the body by those invisibly fine tactile streamlets, the effluences, the eye being taken as an organ of touch, strictly speaking, as already Aristotle complains (cf. de sensu 4. 442a29).

The most detailed presentation of Empedocles' theories of perception is given in Theophrastus' writing *de sensu* (περὶ αἰσθήσεως καὶ αἰσθητῶν):

> (Empedocles) tries also to indicate what the nature of the eye is: and he says that its interior is ether [1] and that around this is water, earth, and air, and that through these something tender is coming out, just as the light in the lanterns (sc., comes out from the interior of the lantern).
>
> πειρᾶται δὲ καὶ τὴν ὄψιν λέγειν, ποία τίς ἐστι· καί φησι τὸ μὲν ἐντὸς αὐτῆς εἶναι πῦρ,[1] τὸ δὲ περὶ αὐτὸ <ὕδωρ καὶ> γῆν καὶ ἀέρα δι' ὧν διιέναι λεπτὸν ὂν καθάπερ τὸ ἐν τοῖς λαμπτῆρσι φῶς.

Within the eye is ether and around it water and earth and air. What is that supposed to mean?

Ether means obviously the *corpus vitreum* and the lense, and water, the aqueous moisture. Earth is the horny coat, the *cornea*, as well as the other coats of the eye, and these have pores in which there is air. And when then it says that "through these" something tender comes out, it can only mean "through the pores of the cornea."

Then Theophrastus continues:

> But (he says that) the pores for ether and those for water are lying (sc., in the cornea) always alternately side by side (meaning: large and small pores – here the ether goes out, there the water), and that through the pores for the ether one (strictly, it is not said who) perceives the white things, through the pores for water, the black ones, for they mutually fit to each other (meaning: the

[1] The Greek word here is *pyr* (πῦρ). Wherever *pyr* cannot mean "fire," in that early period, it means either a dark heatstuff or "ether." There is, of course, no burning fire in the eye. Whether or not Theophrastus mistook it here for "fire" does not matter. But he reports on Empedocles.

different width of the pores is appropriate to the width of the respective effluences); but that the colors are brought to the eye through the effluence.

> τοὺς δὲ πόρους ἐναλλὰξ κεῖσθαι τοῦ τε πυρὸς καὶ τοῦ ὕδατος, ὧν τοῖς μὲν τοῦ πυρὸς τὰ λευκά, τοῖς δὲ τοῦ ὕδατος τὰ μέλανα γνωρίζειν· ἐναρμόττειν γὰρ ἑκατέροις ἑκάτερα. φέρεσθαι δὲ τὰ χρώματα πρὸς τὴν ὄψιν διὰ τὴν ἀπορροήν.
>
> *Theophr. de sensu 7; A 86.*

This clearly shows that Empedocles assumes two primary colors, black and white,[1] and that the colors of the objects are explained through effluences, or rather combinations of effluences.

That Empedocles assumes two primary colors, and that he considers all the other colors mixtures of the two is stated by Theophrastus also in another passage:

> Empedocles (makes a statement) also about the colors, and (he says) that the white (is the color) of the fire, the black (the color) of the water. But as far as the others are concerned, all he says is merely that the white and the black are elementary, but that the others come about by way of these being mixed. For (already) Anaxagoras has spoken about them decisively.
>
> Ἐμπεδοκλῆς δὲ καὶ περὶ τῶν χρωμάτων, καὶ ὅτι τὸ μὲν λευκὸν τοῦ πυρὸς τὸ δὲ μέλαν τοῦ ὕδατος. οἱ δὲ ἄλλοι τοσοῦτον μόνον, ὅτι τό τε λευκὸν καὶ τὸ μέλαν ἀρχαί, τὰ δ' ἄλλα μειγνυμένων γίνεται τούτων. καὶ γὰρ (= for) Ἀναξαγόρας ἁπλῶς (= decisively, completely) εἴρηκε περὶ αὐτῶν.
>
> *Theophr. de sensu 59.*

(This passage has not been quoted among the reports on Empedocles either by Diels or Dr. Kranz. Merely the short statement about Anaxagoras, isolated from the context and accordingly meaningless, has been put at the end of the quotation from Theophrastus' report on Anaxagoras, immediately after *de sensu* 37.)

When a ray of ether from the eye meets ether rays from an object, we see white. When a ray of water from the eye meets rays of water from the object, we see black. And all the other colors come about by mixture of the two. According as ether prevails in the mixture, the

[1] Aetios (I 15, 3; A 92), and he alone, with blatant superficiality ascribes to Empedocles the assumption of *four* primary colors, alleging their number to equal the number of the elements (τέτταρα δὲ τοῖς στοιχείοις ἰσάριθμα). Aetios' contention has been adopted by Dr. Kranz and other philologists.

correspondence will be the so-called warm colors, such as red and yellow; to the prevalence of water will correspond the cold colors, such as green and blue; and to an equal mixture of ether and water the correspondence will be gray.

Furthermore, there is good reason to assume that, according to Empedocles, we never perceive by ether alone or water alone, but that always there is a cooperation of both. Even the purest empirical white would still be mixed with residues of black (which reminds of Anaxagoras). In other words, it just cannot be avoided that with the ether-effluences also water-effluences come along. And likewise would black always have also some residues of white because always also ether-effluences are flowing out, at least from the eye itself, which cannot be hindered either. Always, therefore, would a combination of ether and water be at work, and according as the combining-ratio is.

This was not so understood by Aristotle. In *de sensu* he advances the following objection:

> If indeed the eye were fire, as says Empedocles and as it is written in the *Timaeus* (sc., by Plato), and if vision were taking place by the coming out of the light (sc., from the eye) as from a lantern, why would the eye not see in the dark?
>
> . . . εἴ γε πῦρ ἦν (sc., ὁ ὀφθαλμός), καθάπερ Ἐμπεδοκλῆς φησι καὶ ἐν τῷ Τιμαίῳ γέγραπται, καὶ συνέβαινε τὸ ὁρᾶν ἐξιόντος ὥσπερ ἐκ λαμπτῆρος τοῦ φωτός, διὰ τί οὐ καὶ ἐν τῷ σκότει ἑώρα ἂν ἡ ὄψις;
>
> *Arist. de sensu 2. 437b9; A 91.*

This objection is rather poor, however. And another passage in the next neighborhood likewise shows that Aristotle did not have a very clear conception of Empedocles' theory of vision when he wrote:

> Empedocles seems sometimes to believe that one sees by way of the light coming out (sc., from the eye) . . . while sometimes (he says) that one sees by the effluences coming from the seen objects.
>
> Ἐμπεδοκλῆς δ' ἔοικε νομίζοντι ὁτὲ μὲν ἐξιόντος τοῦ φωτὸς . . . βλέπειν· . . . ὁτὲ δὲ (sc., ὁρᾶν φησιν) ταῖς ἀπορροίαις ταῖς ἀπὸ τῶν ὁρωμένων.
>
> *Arist. de sensu 2. 437b23 and 438a4.*

Thus, Aristotle has overlooked that the eye is not at all merely "fire," but consists of all the four elements, according to Empedocles; that not only ether, or, as Aristotle says, "fire," comes out of the eye, but always also water; and above all, that always both factors must

work together: both effluences from the eye and both effluences from the objects. In the dark, however, the objects do not emit, or reflect, the required effluences. Therefore, the effluences from the eye are of no avail. The ether and water effluences from the eye must meet ether and water effluences from the objects. But in the dark, the objects at any rate do not radiate any ether. And since no ether is flowing toward the eye, any water effluences from the objects would not be visible. The meeting, however, of effluences from the eye with the air element is ineffective for sensation because the air element has no role in vision, according to Empedocles. All this has escaped Aristotle's notice.

Already Anaxagoras had been aware of the fact that among animals there are some seeing better by night, while most of them see better by day (see p. 284), according as the color of the eye was in contrast or not to the color of the environment, contrast being a prerequisite to sensation.

Empedocles, adopting the idea of the contrast as condition for sensation, but advancing far beyond the Anaxagorean suggestion, tries to give a more detailed explanation of the difference between dayseer, nightseer, and twilightseer among animals:

> (Empedocles says) that those (eyes) consist not uniformly of the opposite elements (sc., ether and water), and that the ones have the ether (sc., more or less ether) inside, the others outside (meaning: they are poor in ether or rich in ether, compared with the environment). That is also (he says) why among animals the ones see better by day, the others, better by night. Those having less ether (sc., in the eye) see better by day; for to these the inner light is compensated by the outer light. Those with whom the opposite takes place (see better) by night. For also to these the lacking is filled up again. In the opposite case, it is always the other way, accordingly. For those having too much ether see poorly (sc., by day). ... But those having too much water have the same (shortcoming) by night. ... The most favorably mixed and the best (eye) (he says) would be that which consists of equal amounts of both.
>
> συγκεῖσθαι δ' οὐχ ὁμοίως [1] τὰς δ' (sc., ὄψεις) ἐκ τῶν ἀντικειμένων, καὶ ταῖς μὲν ἐν μέσῳ, ταῖς δ' ἐκτὸς εἶναι τὸ πῦρ· διὸ καὶ τῶν ζῴων τὰ μὲν ἐν ἡμέρᾳ, τὰ δὲ νύκτωρ μᾶλλον ὀξυωπεῖν· ὅσα μὲν πυρὸς ἔλαττον ἔχει, μεθ' ἡμέραν· ἐπανισοῦσθαι γὰρ αὐτοῖς τὸ ἐντὸς φῶς ὑπὸ τοῦ ἐκτός· ὅσα δὲ τοῦ ἐναντίου, νύκτωρ· ἐπαναπληροῦσθαι γὰρ καὶ τούτοις τὸ ἐνδεές· ἐν δὲ τοῖς ἐναντίοις <ἐναντίως> ἑκάτερον. ἀμβλυωπεῖν μὲν γὰρ καὶ οἷς ὑπερέχει τὸ πῦρ· . . . οἷς δὲ τὸ ὕδωρ, ταὐτὸ τοῦτο γίνεσθαι νύκτωρ· . . . ἄριστα δὲ κεκρᾶσθαι καὶ βελτίστην εἶναι τὴν (sc., ὄψιν) ἐξ ἀμφοῖν ἴσων συγκειμένην.
>
> *Theophr. de sensu 8; A86.*

[1] Diels' conjecture <ἀλλὰ τὰς μὲν ἐκ τῶν ὁμοίων> is unnecessary and misleading.

The most favorable combining-ratio, then, of ether and water in the eye would be 1:1. Such eyes would see best, by day, night, and twilight. But whenever the mixture is unequal, what is lacking must be completed by the environment. If inside is little, outside must be much to complement it.

There is among the extant fragments one that is quoted by Aristotle as well as Strabo merely for the linguistical reason that Empedocles here uses ὄψ for ὄψις. Yet, it could be indeed that Bignone (*l.c.*, p. 464) is right when interpreting the sentence,

> One becomes the vision of both,
>
> μία γίγνεται ἀμφοτέρων ὄψ, *(fr. 88)*

as indicating that Empedocles might have been puzzled by the striking fact that with our two eyes we get only one image. There is no mention of it even in Theophrastus' report, though. But it is still not impossible that Empedocles perhaps became alive to the problem involved in the unification of the perceptions of the two eyes, although he may not have been able to find a solution. (See, however, p. 438.)

Finite Velocity of Light Transmission

It was only a matter of course that, as a consequence of his theory of vision, Empedocles had to assume for the emitted effluences a finite, though very great, velocity, in other words, a finite velocity of light transmission.

This was correctly so understood by Aristotle who emphatically rejected such an idea:

> Not correctly have expressed themselves Empedocles and also others in a way as if the light were conducted and took origin some time between the earth and the *peri-echon* (meaning: the surrounding ether), and that we just do not become aware of it. For this is in contrast to any logically deducible truth as well as to any perception. For it could perhaps remain hidden in a small interval,

but to claim that it remain hidden from sunrise to sunset – this is indeed too much of a muchness.

οὐκ ὀρθῶς 'Εμπεδοκλῆς οὐδ' εἴ τις ἄλλος οὕτως εἴρηκεν, ὡς φερομένου τοῦ φωτὸς καὶ γιγνομένου ποτὲ μεταξὺ τῆς γῆς καὶ τοῦ περιέχοντος, ἡμᾶς δὲ λανθάνοντος· τοῦτο γάρ ἐστι καὶ παρὰ τὴν ἐν τῷ λόγῳ ἀλήθειαν καὶ παρὰ τὰ φαινόμενα· ἐν μικρῷ μὲν γὰρ διαστήματι λάθοι ἄν, ἀπ' ἀνατολῆς δ' ἐπὶ δυσμὰς τὸ λανθάνειν μέγα λίαν τὸ αἴτημα.

Arist. de anima II 6. 418b20; (incompletely quoted by Diels and Kranz in A 57).

Ernst Mach, the great Viennese physicist, has reacted upon this famous passage with the remark: "Aristotle with his incapacity of learning from the facts . . ."

The reason for this attitude of Aristotle is given in another no less characteristic passage:

With the light it is a different story: for the light is something by being, but it is not any motion.

περὶ δὲ τοῦ φωτὸς ἄλλος λόγος· τῷ εἶναι γάρ τι φῶς ἐστίν, ἀλλ' οὐ κίνησίς τις.

Arist. de sensu 6. 446b27.

This is the same mistake as was made by Goethe when he did not understand Newton . . .

Theories of Hearing and Smelling

Also hearing is explained as coming about by sensation of like by like. In Theophrastus it says that, according to Empedocles,

hearing originates from the outside sounds when the air, set in motion by the tone, reverberates inside. For the ear (he says) is like a bell of like (*i.e.*, equally tuned) echoes which he calls a fleshy branch. While this is in motion, the air hits against the solid parts and (so) produces the responsive sound.

τὴν δ' ἀκοὴν ἀπὸ τῶν ἔξωθεν [1] γίνεσθαι ψόφων, ὅταν ὁ ἀὴρ [1] ὑπὸ τῆς φωνῆς κινηθεὶς ἠχῇ ἐντός. ὥσπερ γὰρ εἶναι κώδωνα τῶν ἴσων ἤχων τὴν ἀκοήν, ἣν προσαγορεύει σάρκινον ὄζον· κινούμενον δὲ παίειν τὸν ἀέρα πρὸς τὰ στερεὰ καὶ ποιεῖν ἦχον.

Theophr. de sensu 9; A 86.

[1] I keep to the ἔξωθεν of the manuscripts. – Diels' substitution of ὁ ἀήρ for the meaningless γάρ of the manuscripts is ingenious and should not have been changed by Dr. Kranz into a juxtaposition of both γὰρ<ὁ ἀήρ>.

It is, then, so as if there were inside the ear a bell – or a trumpet, for κώδων can mean both – tuned to the same pitch. By "branch" Empedocles wants to indicate – awkwardly expressed, of course, as could not be expected otherwise in those times – that in the interior of the ear there is a swinging, vibratory structure. And by calling it a "fleshy" branch he means to say that it is a living structure that is swinging the same way as a branch swings in the air.

There is not a bit of difference, basically, between the Empedoclean theory of hearing and the theory advanced about two and a half thousand years later by Helmholtz.

The theory of smelling is said to have been constructed in a similar way. In direct continuation of the passage about hearing, Theophrastus says that, according to Empedocles,

smell comes about by inhaling. That is also why those have the sharpest scent who have the most vivid respiratory movement. The most intensive smell flows from the tender and light objects.

ὄσφρησιν δὲ γίνεσθαι τῇ ἀναπνοῇ. διὸ καὶ μάλιστα ὀσφραίνεσθαι τούτους, οἷς σφοδροτάτη τοῦ ἄσθματος ἡ κίνησις. ὀσμὴν δὲ πλείστην ἀπὸ τῶν λεπτῶν καὶ τῶν κούφων ἀπορρεῖν.

Theophr. de sensu 9; A 86.

But what about taste and touch? If one is to give credence to Theophrastus,

there is no explanation in detail given (διορίζεται) concerning both taste and touch, either as to how or through which (factors) they come about. There is merely the general statement that (also here) sensation is conditional upon the fitting to the pores.

περὶ δὲ γεύσεως καὶ ἁφῆς οὐ διορίζεται καθ' ἑκατέραν οὔτε πῶς οὔτε δι' ἃ γίγνονται, πλὴν τὸ κοινὸν ὅτι τῷ ἐναρμόττειν τοῖς πόροις αἴσθησίς ἐστιν.

Theophr. de sensu 9; A 86.

Is Theophrastus Deserving of Belief?

There seems to be something wrong with all this Theophrastean report on Empedocles' theory of perception. If one ponders a little, one cannot help doubting whether the Empedoclean theories have been adequately understood and appreciated.

From Theophrastus' presentation one would get the impression that Empedocles had not very wisely husbanded his resources. Ether for white, water for black – this already calls on two elements for vision

alone. Then air for hearing and earth for smelling – this would mean that nothing is left for the other senses. If one says that like is felt by like only, and man has at least five senses and there are four elements, then four elements would only suffice for four senses. And if two elements are required for vision alone, only three senses could be furnished with elements, and for the rest one would have to extricate oneself with phrases. This is exactly how the Empedoclean theory appears in Theophrastus' description, and this is obviously also Aristotle's opinion about the ideas of Empedocles on perception.

Is it true, is it credible, that Empedocles built up his theory so poorly that he arrived half-way at the embarrassing necessity of making phrases?

What is the proper meaning of the maxim about the cognition of like by like? It is not that we feel water by water as water. It is that we feel water by water as black, and ether by ether, not as ether, but as white, and air by air, not as air, but as sound, and earth by earth, not as earth, but as smell. That is to say, we feel all of these as certain sense qualities.

Furthermore, we do not perceive the colors by ether alone or water alone, but always by the cooperation of both. There is always at work a combination of ether *and* water, even with the purest empirical white and the blackest empirical black. That this was overlooked by Aristotle has been pointed out already (cf. p. 375f.). And that also Theophrastus did not quite understand that Empedocles was operating here with a combination of two follows from his question:

> If he (sc., Empedocles) composes the eye of fire and the contrast (sc., water), one could cognize the white and the black through their like. But how (could one cognize) the gray and the other mixed colors?
>
> τὴν γὰρ ὄψιν ὅταν ἐκ πυρὸς καὶ τοῦ ἐναντίου συστήσῃ, τὸ μὲν λευκὸν καὶ τὸ μέλαν δύναιτ' ἂν τοῖς ὁμοίοις γνωρίζειν, τὸ δὲ φαιὸν καὶ τἆλλα χρώματα τὰ μεικτὰ πῶς;
>
> *Theophr. de sensu 17; A 86.*

In the optical field, then, sensations are conditional upon a *combination of two elements*, according to Empedocles. Should it not be almost inevitable to expect that *for each field of sensation* he might have operated with combinations of two?

According to a simple formula, the number of combinations of two for four is $\frac{4 \times 3}{1 \times 2}$, which makes 6. Thus, Empedocles had at his disposal six combinations of two. Let us see whether this would solve his problem.

(1) Ether – water corresponds to vision. This has been discussed already.

(2) Ether – air would correspond to the sense of temperature. Ether prevailing would make for warmth; air prevailing, for cold.

(3) Ether – earth would correspond to the sense of touch, with ether making for softness, earth for hardness.

(4) Air – water would correspond to hearing. In humid air one hears over greater distances than in dry air.

(5) Air – earth would correspond to smell. The fine and light, but solid, effluences give the inhaled air its scent.

(6) Earth – water would correspond to the sense of taste. Pure water has no taste, nor has any solid unless solved in a liquid.

According to the intrinsic necessities of the technique of composition, these six combinations appear to be the basis of the genuine Empedoclean theory of perception, and Adolf Stöhr, whose casual suggestion on this point I have been following up, has obviously once again hit the right nail on the head.

For if the presentation by Theophrastus of Empedocles' theory were correct, man would have to possess three senses only and, moreover, within two of these three senses there could not even be any distinctions or shades.

Yet, if a man maintains it is absurd to believe that light is conducted, it is only natural to expect him also not to have found out that, to Empedocles, each combination of two elements perceives another combination of the same elements as a sense quality. And what holds true of Aristotle applies obviously all the more to his disciple Theophrastus.

The Problem of Soul

Man has sensations. But what about the objects? Do they, too, have sensations, actual sensations?

The answer is not easy. One cannot simply say: Of course, they must likewise have feelings since they, too, are sending out effluences, apart from the fact that they consist of the elements, these being not only "matter," but also "consciousness." But pointing at the slumbering consciousness of the elements would not be the answer.

The organisms, men, animals, and plants, do have sensation. That much is certain. As Sextus Empiricus expressly states,

Empedocles still more paradoxically maintained that all things happen to be endowed with reason, and not only the animals, but also the plants.

Ἐμπεδοκλῆς ἔτι παραδοξότερον πάντα ἠξίου λογικὰ τυγχάνειν καὶ οὐ ζῷα μόνον ἀλλὰ καὶ φυτά.

Sext. adv. math. VIII 286.

And then Sextus quotes that verse in what is now fragment 110 where it says,

You shall know, all things have mind and a share in cognition,

πάντα γὰρ ἴσθι φρόνησιν ἔχειν καὶ νώματος αἶσαν,

thus indicating that by *panta* (πάντα), which is an incomplete, ambiguous expression, he himself understood, not *panta onta* (πάντα ὄντα), "all that there is," but merely *panta phyomena* (πάντα φυόμενα), "all that grows," that is "all the organisms."

The organisms, however, seem to have sensations because, in addition to effluences, they obviously have also a faculty of sensation that seems to depend on the possession of something that one may call some sort of a soul. In what way could Empedocles have constructed something like that?

This is a question we are not yet able to answer. For so far we have been dealing with Empedocles the natural philosopher only. But, as already pointed out, his was a double nature. There is also Empedocles, the religious reformer, the priest of purifications. And from the remains of the *Katharmoi*, containing his (unsuccessful) attempt at a reformation of religion, we know that Empedocles teaches a personal pre-existence and post-existence, in other words, a "long-living" soul.

It does not appear to be easy to reconcile such a teaching with that part of his system which has been described in the foregoing. On the other hand, it would not be justified to consider his natural philosophy and his teaching of personal pre- and post-existence altogether incompatible and speak of a "conversion" of the philosopher who, under the blow of his personal fate, has allegedly gone "mystic." Empedocles was wandering about as a priest of purifications and, at the same time, was a physician and a natural philosopher. If one keeps that in mind, then one understands that *Peri Physeos* and *Katharmoi* are from the same mould:

Everything that had an ethical point and could be a religious dogma had to be dropped in the natural philosophy, while in the religious

work all those things had to be omitted which are of interest only for the mechanics of world evolution. For the problems of a pure natural philosophy personal pre- and post-existence is insignificant. All that is important for ethics and religion, therefore, is dealt with in *Peri Physeos* only in passing, only incidentally. The origination of the world has no moral point, yields no moral meaning for the world. Accordingly, personal pre- and post-existence is put into the forefront in the *Katharmoi*, while in *Peri Physeos* this is just slightly touched in a few hints only. For it is not true that in *Peri Physeos* there is no mention at all of the pre- and post-existence of personality.

Some of these hints in *Peri Physeos* are rather noncommittal, though, and could also be interpreted as a simple, trivial emphasizing of the eternity of the elements. But some are almost outspoken.

Take, for instance, the following verses:

Now I shall tell you a different thing. Of all the mortals
There is no birth and there is no end in ruinous death, but
Merely a mixing is there and an exchange of the things mixed.
This, however, is called a birth among human beings (i.e., in human language).

ἄλλο δέ τοι ἐρέω· φύσις οὐδενός ἐστιν ἁπάντων
θνητῶν, οὐδέ τις οὐλομένου θανάτοιο τελευτή,
ἀλλὰ μόνον μῖξίς τε διάλλαξίς τε μιγέντων
ἔστι, φύσις δ' ἐπὶ τοῖς ὀνομάζεται ἀνθρώποισιν.

fr. 8 (Plut. adv. Col. 10 p. 1111 F; Aet. I 30, 1).

"Now I shall tell you a different thing" could mean: something different from the doctrine of elements, namely, pre- and post-existence of man. But it could as well be just a more or less mechanical employment of the stereotyped Homeric phrase, ἄλλο δέ τοι ἐρέω. And the whole sentence could also simply refer to the eternity of the stuff in its metabolism and need not aim at personal pre- and post-existence.

Similarly noncommittal, strictly speaking, is another passage:

Yet, whenever things mixed in the manner of man come to light
Or in the shape of wild beasts or of shrubs or of birds of prey,
They would say that then a birth has taken place.
But when the mixed is severed, they call it fatal death.
They are not right in calling it so. But by way of convention
I am using this word myself.

οἱ δ' ὅτ(ε) ἴκῃ κατὰ φῶτα μιγέντ' εἰς αἰθέριον φῶς [1]
ἢ κατὰ θηρῶν ἀγροτέρων γένος ἢ κατὰ θάμνων
ἠὲ κατ' οἰωνῶν, τότε μὲν τὸ <λέγουσι> γενέσθαι,
εὖτε δ' ἀποκρινθῶσι, τὸ δ' αὖ δυσδαίμονα πότμον·
ἣ θέμις <οὐ> καλέουσι, νόμῳ δ' ἐπίφημι καὶ αὐτός.

fr. 9 (Plut. adv. Col. 11 p. 1113 AB).

Not so easy, however, is it to take as noncommittal the following:

Fools they are indeed: for not far-seeing thoughts do those have
Hoping what has not been there before can begin to exist or
Fearing [2] that anything dies and is getting destroyed completely.

νήπιοι· οὐ γάρ σφιν δολιχόφρονές εἰσι μέριμναι,
οἳ δὴ γίγνεσθαι πάρος οὐκ ἐὸν ἐλπίζουσιν [2]
ἤ τι καταθνῄσκειν τε καὶ ἐξόλλυσθαι ἁπάντῃ.

fr. 11 (Plut. adv. Col. 12 p. 1113 C).

Here the rejection of origination from nothing and vanishing into nothing can be referred not only to the stuff, but also to consciousness, and even to personal pre- and post-existence. True, Empedocles could perhaps have meant to indicate merely that in death consciousness is not exstinguished, but is pulverized into a multitude of tiny consciousness-units; that with the pulverization of the stuff of the body also consciousness is split and pulverized and distributed partly to animals and plants, partly falls asleep entirely when returning into the free elements. If that be the meaning, then this is more than merely the eternity of the elements, though. It would be also the eternity of consciousness: an eternity of consciousness in the consciousness of the stuff where it is eternal potentially only and would become actual whenever effluences and a soul will be possible. But it would not be an eternity of personality.

If, however, Empedocles had merely this in mind, then the word *elpizousin* (ἐλπίζουσιν) is out of place. For in this case there would be nothing to hope for or be afraid of. Personality is gone, and what do I care for the consciousness of an atom? But Empedocles calls here those people fools, imbeciles. Psychologically, therefore, it is virtually impossible to interpret this passage as referring to a mere eternity of stuff and consciousness, but without preservation of personality.

[1] I adopt Bignone's version of the line.
[2] ἐλπίζειν can mean both "to hope" and "to fear." That is why I repeat the verb, and in the appropriate meaning. Diels' "*überzeugt sind*" and Kranz' "*glauben*" are not very satisfactory.

There is still another passage that likewise, because of one word it contains, can hardly be interpreted as neutral, although it is not perfectly outspoken:

No wise man might believe in his mind such-like things: that the mortals,
As long as they live what people are calling a life,
So long do they exist and experience bad things and good ones,
But that before they were composed and when they are severed,
They are just nothing.

οὐκ ἂν ἀνὴρ τοιαῦτα σοφὸς φρεσὶ μαντεύσαιτο,
ὡς ὄφρα μέν τε βιῶσι, τὸ δὴ βίοτον καλέουσι,
τόφρα μὲν οὖν εἰσίν, καί σφιν πάρα δειλὰ καὶ ἐσθλά,
πρὶν δὲ πάγεν τε βροτοὶ καὶ <ἐπεὶ> λύθεν, οὐδὲν ἄρ' εἰσιν.

fr. 15 (Plut. adv. Col. 12 p. 1113 D).

Here the telling word is "they" when he says, "So long they experience bad things and good ones." If consciousness is merely pulverized and distributed, personality ceases to be. In this case, Empedocles could not have said that "they" experience good and bad things. For "they" would then not be there any more. Thus, here pre- and post-existence cannot be rejected as a possible meaning, although this sentence is no strict proof, either. Plutarch, at least, making use of this quotation in his polemic against the Epicurean Colotes, did interpret it as the utterance

of somebody who rather believes that those who have not yet been born as well as those who have already died do exist,

εἶναι δὲ μᾶλλον οἰομένου καὶ τοὺς μηδέπω γεγονότας καὶ τοὺς ἤδη τεθνηκότας.

(l.c.)

But if Empedocles taught, as in fact he did, a personal pre- and post-existence, he must have assumed something like a soul.

In the extant fragments of *Peri Physeos* the word *psyche* (ψυχή) is nowhere used. And in the only fragment of the *Katharmoi* where the word is used (fr. 138) it does not mean "soul," but simply "life." But this does not matter. For the Empedoclean term for "soul" just is not *psyche*, but *daimon* (δαίμων). This peculiar usage was well understood by ancient writers and did not keep them, when discussing Empedoclean tenets, from calling, in simple, everyday phraseology, *psychai* what he used to designate as *daimones*.

Among those various testimonies about Empedocles having assumed "souls" (or having adopted such an assumption from other sources), there is one that implies some important information. It is a report in Aetios on what was called divine by Empedocles:

> But he calls gods the elements as well as this world, the mixture of these (elements), as also that previous, homogeneous being (sc., the Sphairos) into which it (sc., the world) will be also dissolved. And divine he considers also the souls, but likewise those pure ones who have got them (sc., the souls) in a pure manner.
>
> λέγει δὲ καὶ τὰ στοιχεῖα θεοὺς καὶ τὸ μῖγμα τούτων τὸν κόσμον καὶ πρότερον, εἰς ὃ καὶ ἀναλυθήσεται, τὸ μονοειδές [1] καὶ θείας μὲν οἴεται τὰς ψυχάς, θείους δὲ καὶ τοὺς μετέχοντας αὐτῶν καθαροὺς καθαρῶς.
>
> *Aet. I 7, 28; A 32.*

"Those pure ones" are not the souls, but those men whom Empedocles calls divine because they have their souls in a pure manner. And pure they are because they refrain from bloody offerings and from killing any animals.

That is to say, Empedocles distinguishes men who have got a soul, and souls which have not got a human body because they happen to be still in the pre-existence or already in the post-existence. Hence, every human body has a psyche, but not every psyche has a human body.

But what exactly is a soul supposed to be when separated from, or not yet bound to, a body? This question is not answered in Empedocles' natural philosophy.

THE KATHARMOI

Containing Empedocles' attempt at founding a new religion, or to put it less presumptuously: at a religious reform, the *Katharmoi* are tuned to a tone utterly different from his natural philosophy.

> Once before I already was a boy and a girl, a
> Bush and a bird of prey and a voiceless fish from the sea.
>
> ἤδη γάρ ποτ' ἐγὼ γενόμην κοῦρός τε κόρη τε
> θάμνος τ' οἰωνός τε καὶ ἔξαλος ἔλλοπος ἰχθύς.
>
> *fr. 117 (Diog. VIII 77; Hippol. ref. I 3).*

[1] This is Usener's version. I prefer it to Diels' conjecture πρὸς τ<οὔτοις τὸν Σφαῖρον, εἰς ὃν πάντα ταῦτ>' ἀναλυθήσεται.

This Empedocles says of himself. But it holds true of every human being. The difference is merely: he knows it, and the others know it not.

How can all this be? For Empedocles does not mean to say by that: I was, as a consciousness, distributed all over the world and now I am here concentrated. According to those verses, he was not just simply merged into the universe, but was, of course, a certain boy, a certain, individual bush, etc.

This is possible only if there was a fine, tender organization, a psyche of Empedocles, wandering through many short-lived organisms, without being dissolved in death of an organism, and, in the times between, living somewhere in the free elements.

That is a wide-spread conception, after all. The Indian *suksma sariram* belongs here. It is also the only possible way to realize what Heraclitus and, obviously, also the Pythagoreans may have had in mind. And exactly the same conception is still there with Tertullian even, the well-known Christian writer.

We may, therefore, safely assume that Empedocles was thinking of his *daimones* as of tender, but long-lived organisms that live through a whole world period, wander through short-lived, coarse organisms, and are able to subsist during the intervals in the free elements.

The Birth-Place of the Souls

The souls are not immortal. They are only long-lived, only

> demons who have come in for a long duration of life.
>
> δαίμονες οἵτε μακραίωνος λελάχασι βίοιο.
>
> *(fr. 115, 5).*

When and where do they come into existence?

The answer is implied in the clarification, only now finally feasible, of an obscure passage in *Peri Physeos* the explanation of which we had to postpone.

According to fragment 35, Hatred when repelled by Love does not retire uniformly and symmetrically, but only from the lower pole of the world sphere, escaping at last from there after having remained longest in the lower hemisphere, while Love penetrates in the horizontal plane. If life takes origin in the horizontal section, at the boundary between earth and air, because there all the four elements are meeting, if therefore indeed there were no organisms either above or below, then one should have expected Hatred to recede symmetrically upwards as

well as downwards and retire finally from the upper and the lower world poles.

Now it is clear why this is not so. Empedocles needs the upper world hemisphere. There the psyches are produced. They are tender organisms consisting of ether and air, not needing water and earth. In the middle of the world only the coarse organisms take origin.

It was not clear, either, why Philotes had to invade the world exactly at the equator. It now turns out that this is not true anyway. Love enters at the upper pole and dislodges Hatred, her enemy, from above downwards. At the boundary between ether and air she produces first the pure psyches, those fine organizations which then happily hover about in that lofty region.

Only afterwards, when the souls are already in existence, Love reaches the equator of the world and in that middle section causes the origination of the short-lived, coarse organisms. That is to say: the souls are older than the bodies.

The Downfall into Earthly Life

Then the souls fall down to earth and unite with the bodies. They animate those coarse organisms. The reason why they have to fall down is not quite clear. It may be that this downfall into human existence has been simply taken over from Heraclitus. For in the *Katharmoi* Empedocles is not a bit original.

The souls, then, plunge down to the place where the bodies are, they tumble into this life. But they do not like it. From the very first moment, they are displeased with it, just as Empedocles was who complains:

> When I saw the unwonted place, I wept and lamented.
>
> κλαῦσά τε καὶ κώκυσα ἰδὼν ἀσυνήθεα χῶρον.
>
> *fr. 118 (Clem. Strom. III 14; Sext. adv. math. XI 96).*

And:

> From what a rank and deepest bliss have I had to leave
> Thus the Olympus and am mingling now with mortals!
>
> ἐξ οἵης τιμῆς τε καὶ ὅσσου μήκεος ὄλβου
> ὧδε λιπὼν <τὸν Ὄλυμπον [1]> ἀναστρέφομαι μετὰ θνητῶν.
>
> *fr. 119 (Clem. Strom. IV 12; Plut. de exil. 17 p. 607 D).*

[1] Bignone's conjecture.

This, incidentally, is highly characteristic. He does not say: "From what height of intelligence." He says: "From what exuberance of bliss." They are blissful indeed, those psyches. They are akin somehow to Sphairos. They know less and love more ...

But why do they not like this earthly life?

When the coarse organisms are produced, Hatred has been already pushed into the lower hemisphere. But for a very long time this evil demon still makes himself felt in that border plane of his realm. Here he doggedly struggles and fights for each and every one of those living beings. And since thus Hatred is still at work among the bodies, these are having bloody fights with each other, and so their souls turn into souls of criminals. They become bad, commit crimes to the bodies, become criminals themselves, and then, committing crimes and suffering crimes, have to wander from one body into another and also into the free elements – exactly as it corresponds to the well-known Indian conception. No wonder, therefore, that the souls do not like this earthly life, so full of all those horrible evils (as described in fragment 121).

This wandering of the soul will last "three times ten thousand seasons" (τρὶς μυρίας ὥρας, fr. 115, 6), that is ten thousand years, the year taken as three seasons.[1] During this time, the souls will be "exchanging the paths of life," being chased by Hatred now through all kinds of organisms, now through the free elements. It is for ten thousand years that Hatred has power over each individual psyche in his grip.

The rule of Hatred over the world, however, lasts somewhat longer. For all souls do not come down exactly at the same time.

And later on, the future reign of Love will likewise last for about ten thousand years – one should expect ...

What Empedocles Passes Over in Silence

Yet, this Empedocles does not say. Not in the *Katharmoi*! For here speaks not the natural philosopher, but the preacher of a new religion. That after the victory of Love, Hatred will come back again and there will be new struggles and fights, this belongs into the secret doctrine in *Peri Physeos*. But it must not be said here by any means.

In the *Katharmoi*, the purpose is to characterize our world period, the way from Akreta Zora toward Sphairos, the way upwards. This is the only thing possible for a religion. It must go upwards. It must end with

[1] Cf. A. Dieterich, *Nekyia*, p. 119.

lasting, eternal perfection. To pronounce, instead, an ever recurrent up and down would be disastrously discouraging and depressing.

There is still another thing that in the *Katharmoi* is not mentioned and also must not be said because it would not be understood by the public at large or, if understood, would be felt as a profound disappointment:

That the ultimate victory of Love will mean the end of all individual life, that all the many individual personalities will cease to exist as such, the plurality of consciousness-units being merged and fused into the one overall consciousness of the Sphairos, this is predicted in *Peri Physeos*, though, where it says, in fragment 26, that all individual living beings will then have "gone under" again (ὑπένερθε γένηται). But nothing of the kind is to be found in the *Katharmoi*. Here there are, instead, some hints about a return, by the victory of Love, of something like a Golden Age, akin to those blissful olden times of mankind as described in the popular myths ...

Not Punishment, But Fate

What the soul experiences during the rule of Hatred is fate, not punishment.

The soul is committing crimes because it is now under the grip of the demon Hatred that does not let it go before the time is over. And it also suffers crimes from others because they, too, are under the reign of Hatred. The usual translation, therefore, of κακότης in Empedocles as "sin" is misleading. Κακότης is "badness," and "badness" does not necessarily have the connotations of "sin."

That is also why here, in the *Katharmoi*, Love is from the very outset a good god and Hatred merely a demon, a malicious devil. In the natural philosophy such distinction is only sporadic, but in general there are no such evaluations since there Love and Hatred are powers that merely have to keep the world going.

Philotes, the good, life-preserving goddess, feels hurt and offended by life-destroying offerings. In this way only Hatred, the vicious devil, is venerated who takes pleasure in bloodshed. Therefore, Empedocles (just like Xenophanes, Heraclitus, and the Pythagoreans) demands abstention from bloody offerings and even from the killing of any animal. For all psyches form one, great family and besides, with regard to that migration of the souls, one can never know whether an animal to be killed is not indeed a closest relative ...

Empedocles, the Awakener and Prophet ...

We are on the way from Akreta Zora back to Sphairos. Ten thousand years is the duration of the rule of Hatred over the individual soul. The souls fall down into human existence at different times. The bloody age, therefore, will last a little longer.

But just because the souls fall down at different times, there will also be among them one the first to get through with those 10.000 years. And the first to be set free again is Empedocles himself, of course.

It is of no avail to say to men, "Pull yourself together! Shorten that time of Hatred!" For they just are under the sway of an iron fate. But Empedocles is the first to become free; the first, therefore, to awake to that other life, the life in Love; the first to be pure and divine again, "an immortal god, no longer mortal" (θεὸς ἄμβροτος, οὐκέτι θνητός, fr. 112, 4). And now he wants to awaken those others who likewise are already close to their liberation, close to their becoming "seers and bards and physicians and princes and, finally, gods" (cf. fr. 146). He, Empedocles, is the one who walketh at the head, the awakener who now announceth what will come to pass, he, the first servant of Philotes, – and the founder of a religion is ready and finished, complete with all the trimmings and paraphernalia ...

Empedocles' attempt at a new religion was a failure. His "new" religion, obviously, was not new enough. It was too much of a *mixtum compositum* of gleanings from other and too well known fields.

Besides, however: No actor can win lasting influence in things religious. Empedocles, a basically theorogon type, was playing the "redeemer." And that just does not work in the long run. The undeniable fascination of his brilliant personality was doomed to fading when he himself had disappeared.

EMPEDOCLES AND POSTERITY

Not as the prophet of an allegedly new religion has Empedocles survived his death. He has survived as the champion of the Sicilian school of medicine, as the initiator of what later on was called the art of rhetoric, as standard-bearer of democracy, and as philosopher. Of a great immortalizing power have also been the mysterious legends about his death.

Empedocles' important role as physician belongs to the history of

medicine and has been duly appraised by expert writers, such as Wellmann [1] and others.

His gift of powerful oratory was praised through all antiquity, not at least due to the fact that Aristotle called him the "inventor" of rhetoric, and that, according to testimonies [2] which there is no justifiable reason to doubt, Gorgias, the famous orator and sophist, was a disciple of Empedocles'.

How exactly his activities as a politician may have to be evaluated from a strictly and soberly historical viewpoint is quite a question. But no matter what the answer to this question would be, it is a fact, at any rate, that up to this day the people of his hometown in Sicily have never ceased to honor his name, and that by followers of Mazzini (1805–1872), one of the leaders of the Italian *Risorgimento*, Empedocles has been celebrated as the democrat *par excellence* of antiquity. Obviously the main reason for such high esteem has been Aristotle's attestation that Empedocles refused to accept the crown when his fellow-citizens offered him the kingship.

The Impact of the 'Katharmoi'

Though not as initiator of a new religion, but nevertheless as the author of the *Katharmoi* did Empedocles have some impact on antiquity.

Exactly that item of his teachings there which in fact appears to be an adaptation to the intellectual capacities and emotional proclivities of an average public, his hints about a Golden Age under the aegis of Love (cf. p. 390), has had remarkable resonance in later ancient poetical literature. Ovid's *Metamorphoses, e.g.*, in the description of the *aurea aetas* were influenced by the *Katharmoi* (though not directly, but *via* Varro and Posidonius, presumably).

Also Empedocles' preaching of a palingenesis of the souls, though never considered a specifically Empedoclean doctrine, was frequently remembered, and sometimes vehemently rejected, as, *e.g.*, by the 2nd century A.D. Epicurean Diogenes of Oinoanda (in fr. 35 of the great Inscription), sometimes slightly mocked, as by the Christian writer Hermias (2nd century or, according to Diels, 5th or 6th century) who in his *Irrisio gentilium philosophorum* (Ἑρμίου φιλοσόφου διασυρμὸς τῶν ἔξω φιλοσόφων) wrote:

[1] M. Wellmann, *Die Fragmente der Sikelischen Aerzte*, Berlin, 1901.
[2] Satyros ap. Diog. Laert. VIII 58; Quintilian, *Institutio oratoria* III 1, 8.

> Now I am immortal, and am pleased at it, and now again I become mortal, and I weep; then, again, I get dissolved into atoms, I become water, become air, become fire; thereafter one makes me into a wild beast, into a fish, – and then, in addition, Empedocles makes me even into a shrub.
>
> . . . νῦν μὲν ἀθάνατός εἰμι καὶ γέγηθα, νῦν δ' αὖ θνητὸς γίνομαι καὶ δακρύω· ἄρτι δὲ εἰς ἀτόμους διαλύομαι, ὕδωρ γίνομαι, ἀὴρ γίνομαι, πῦρ γίνομαι· εἶτα . . . θηρίον με ποιεῖ, ἰχθύν με ποιεῖ, . . . ἔτι δὲ ὁ Ἐμπεδοκλῆς καὶ θάμνον με ποιεῖ.
>
> *Hermias, Irrisio 4.*

But on the whole, after the great initial success of the *Katharmoi* when they were recited in Olympia by the rhapsodist Cleomenes, their impact seems to have been fading until the Neoplatonists and particularly Porphyrios (232–after 300 A.D.) revived them to a certain extent. Yet, this was done by way of a bowdlerization of the Empedoclean tenets about the soul into a doctrine of downright neoplatonistic effulgurations, a doctrine of only a faint similarity with what Empedocles himself had taught.[1] This neoplatonistic transformation then persisted through the Middle Ages in those various writings falsely attributed to Empedocles, known as the works of Pseudo-Empedocles.

Shortly before Porphyrios, the Christian writer Hippolytus (about 220) had interpreted the *Katharmoi* in a platonistic, Christian, and ascetic sense. He mistook the Sphairos for the *kosmos noetos*, the "intelligible world"; took for punishment what in fact was meant as the dire consequence of an inevitable fate; and imputed to Empedocles an alleged prohibition for his disciples of any sexual intercourse with women, because

> matrimony, according to Empedocles as we have demonstrated, destroys oneness and makes for plurality,
>
> διαιρεῖ γὰρ ὁ γάμος κατὰ Ἐμπεδοκλέα τὸ ἓν καὶ ποιεῖ πολλά, καθὼς ἀπεδείξαμεν,
>
> *(Hippol. ref. VII 30; introd. to fr. 115).*

where the remark, "as we have demonstrated," betrays that this is merely an interpretation by Hippolytus. (That then the same interpretation is also in Porphyrios is, of course, no proof of its correctness.)

[1] Cf. F. Altheim, *Porphyrios und Empedokles*, Tübingen, 1954.

Endurance of the Philosophy

In the main, however, it was certain features of Empedocles' philosophy that had the strongest and most lasting influence on his posterity.

That Empedocles had also been playing a role as religionist and priest, this must have been either forgotten very soon or was perhaps not taken seriously. Otherwise one would not understand how a "pious priest" could have been denounced as allegedly one of the sponsors and supporters of atheism by Plato. Jumbling up Empedoclean, Democritean, and Sophistic tenets, in Book X of *The Laws* (887C–890A) he inveighs against those

> saying that fire and water and earth and air exist all by nature and chance, but none of them by art
>
> πῦρ καὶ ὕδωρ καὶ γῆν καὶ ἀέρα φύσει πάντα εἶναι καὶ τύχῃ φασί, τέχνῃ δὲ οὐδὲν τούτων,
>
> *(The Laws, 889B).*

and makes them responsible for the spreading of the "disease" (νόσος) of disbelief in the existence of the gods.

The doctrine of the four elements has become the most famous, most generally known item of Empedocles' philosophy. The Anaxagorean elements are even today not easy to grasp. But the Empedoclean four elements are understood by the simplest man in the street. That is also why this doctrine remained in power through the ages until the second half of the eighteenth century when it was dethroned by the revolutionary start of modern chemistry.[1]

The Empedoclean dualism of Love and Hatred as the ruling forces in the world process was to be vigorously revived in that thrilling 200 years period previous to Descartes that in so many respects reminds of the pre-Platonic era.

The physician, astronomer, poet, and philosopher Girolamo Fracastoro (1483–1553) wrote a book, *De sympathia et antipathia,* in which there is virtually a renewal of the respective doctrine of Empedocles as well as of his theory of incessant effluences from all bodies. Also according to Hieronymus Cardanus (1501–1571), all things are animated and alive and filled with sympathy and antipathy, with love and hatred.

[1] Much information on the fate of the Empedoclean four elements doctrine in antiquity is given in an appendix to the Empedocles book of Bignone. Concerning the history of this doctrine in the middle ages and the modern times, Bignone points at writings of Berthelot, especially *La Révolution chimique: Lavoisier,* Paris, 1890.

Particularly great and lasting, however, has been the influence of that teaching of Empedocles which by Aristotle has been summarized in the formula, "cognition of like by like."

Yet, this principle had its actual and far-reaching historical influence not exactly in the way in which it was meant by Empedocles. That "we feel water by water" etc. was not interpreted as meaning that by the water in us we feel the water outside as a certain sense quality (as the color black in this case). Instead, it was taken to mean that by the water in us we feel the water outside as water and that, quite generally, all things to be perceived must as such be present in the soul. And so the Empedoclean principle exercised its impact by provoking opposition to such allegedly crude opinion.

Best proof are two sentences in St. Thomas Aquinas' commentary to Aristotle's *De anima* III 8. 431b21ff. (*lectio* 13b):

> He (sc., Aristotle) shows that (the soul) is all things in another way than the ancients would contend, and he says that, if the soul is all things, it is necessary either that *it be the knowable and sensible things themselves, as Empedocles has contended that by earth we know earth, by water, water, and likewise about the others,* or that it be their ideas. The soul is not the things themselves, however, as those (ancients) have contended, because in the soul there is no stone, but the idea of stone.[1]

> Ostendit, quod alio modo (anima) est omnia, quam antiqui ponerent, et dicit, quod, si anima est omnia, necesse est, quod sit vel ipsae res scibiles et sensibiles, sicut Empedocles posuit, quod terra terram cognoscimus, et aqua aquam et sic de aliis, aut sit species ipsorum. Non autem anima est ipsae res, sicut illi posuerunt, quia lapis non est in anima, sed species lapidis.

As a consequence, rejecting such naiveté, St. Thomas has given the Empedoclean teaching a refined form. To him it means: "The known is in the knower in the manner of the knower" (*"cognitum est in cognoscente per modum cognoscentis"*) or, still more generally: "Whatever is received, is received in the way of the receiver" (*"quidquid recipitur, recipitur per modum recipientis"*).

[1] The italics are mine.

In this transformation, the Empedoclean (and, as has been shown [cf. p. 261], already Anaxagorean) tenet has become the cardinal principle, emphasized again and again, of St. Thomas' epistemology from which there is only one step to the Transcendental Aesthetics of Immanuel Kant . . .

Immortalizing Power of the Legends

Most effective in keeping the memory of Empedocles alive with the public at large were the mysterious legends about his death. A philosopher and poet who claims to have become a god and jumps into the Etna volcano to prove it – this is indeed too thrilling a story not to stir and stimulate the imagination even of those not exactly interested in philosophy proper.

Nevertheless, as far as we know, not before the era of Romanticism more than twenty-two centuries after his day did Empedocles become a hero of dramatic poetry. The (unfinished) tragedy "*Empedokles*" by Friedrich Hölderlin (begun before 1798) opens the series of works of poetry around the personality of the fascinating Sicilian. Almost as famous as Hölderlin's drama is the dramatic poem "Empedocles on Etna" by Matthew Arnold (London, 1852), the well-known Victorian English writer. And the stimulus to poetical treatment has not yet diminished. A drama "*Empédocle*" by the Frenchman Raymond Guérin could reach in 1950 its 5th edition, and as recently as 1954, an Empedocles drama in 5 acts was published in Switzerland by Erich Brock under the title "Gods and Titans" ("*Götter und Titanen*").

Although it might be interesting enough to compare the various Empedocles pictures in these and some more poetical products, it would of course lead far beyond the task and purpose of this work.

3. THE ATOMISTS

There is still another group of Agenetists: the Atomists.

The assumption of tiny particles of which all things are composed is not the characteristic feature of atomism. Such tiny particles were postulated by all the Agenetists, of course. The proper difference has been found out by Aristotle already who distinguishes those assuming ultimate particles which just happen not to be actually divided any more and those assuming indivisible ultimate particles, that is to say, particles which cannot be divided by any means (De caelo III 6. 305a1; cf. p. 346).

The feature of indivisibility applies to the *atomoi* of the Atomists by definition, by a notional decree, as it were, and is independent of any size of those particles. In general, they are so small "as to escape our sense perceptions" (ὥστε ἐκφυγεῖν τὰς ἡμετέρας αἰσθήσεις [Simpl. de caelo 294, 33; A 37]). But their smallness has nothing to do with their indivisibility. Accordingly and quite consistently, the Atomists have also assumed certain atoms of gigantic size (cf. p. 407).

The common trait of the Agenetists is the assumption of unchangeable ultimate constituents of the world, and the specific difference between the various types of Agenetists lies in what exactly is supposed to be unchangeable. To Anaxagoras, the unchangeable was the various sense qualities. With Empedocles, the four elements were the unchangeable, that is to say, solid bodies, tiny corpuscles of the four elements. According to the Atomists, however, the unchangeable is *shape* and *size* of certain solid corpuscles.

As to their material, the corpuscles are supposed to be all alike, differing only in shape and size. And they are moving by themselves in an empty space. Thus, there is here a certain trend back toward the construction ideal of the oneness of stuff that had to be given up together with the naive idea of changeability.

Yet, the endeavor toward oneness has failed. There still remains the plurality of the various shapes and sizes and the fundamental duality of the full and the empty . . .

All this has nothing to do with any regard for Parmenidean tenets, except in the sense of strict opposition. Apart from that unremovable plurality, the whole atomistic construction, with motion as a primordial property of the atoms, would not have been possible if the Parmenidean prohibition of change of place (τόπον ἀλλάσσειν) had in any way been heeded. The contention, however, that the Atomists reduced all changes to changes of place because only in this way they could comply with an allegedly Parmenidean supreme "Canon of No-Becoming" – this contention is too discrepant from Parmenides' own words to be taken seriously (cf. p. 329).

LEUCIPPUS OF MILETUS

(?–?)

DEMOCRITUS OF ABDERA

(493–404 B.C.)

INTRODUCTION

Leucippus and Democritus are the names of those two men who were the founders of ancient atomism. Leucippus is supposed to have been the master, Democritus the disciple.

It is puzzling how little we know about Leucippus. As to his birthplace, the best guess might be to take him as a Milesian. Yet, it is impossible to determine when he was born and when he died. In Aristotle (Metaph. I 4. 985b4), Democritus is called the *hetairos*, the "friend," of Leucippus, but nothing is indicated about the ages of the two. Presumably Leucippus was the older one. But they could as well have been of approximately the same age, after all. And at any rate, all depends on the right answer to the question of when Democritus himself might have been born.

In this respect, we have a clue. In a fragment of his writing "The Small Order," *Mikros Diakosmos*, Democritus says he was still young when Anaxagoras was already old. And besides, all sources virtually concur in the statement that Democritus was by forty years younger than Anaxagoras. Adopting the findings of K. F. Hermann and G. F. Unger (cf. p. 170), we have decided to accept 533 B.C. as the year of Anaxagoras' birth. Accordingly, Democritus would have been born in 493 B.C., which would be in keeping with Diodorus' remark (XIV 11, 5; A 5) that he died in Ol. 94, 1 (= 404 B.C.) at an age of 90 years. (The usual assumption in accordance with Apollodorus that he was born in 460 B.C. would therefore not seem to be tenable.)

Thus, Leucippus might have been either a little or considerably or much older than his "friend" Democritus.

Then there is a report in Hippolytus (ref. I 12; 67A10) that Leucippus allegedly was a hearer of Zeno the Eleatic, but did not follow his doctrine, and a similar statement in Simplikios (Phys. 28, 4; 67A8) that Leucippus had attended the courses of the Eleatics, but did not accept

their teachings and went himself in exactly the opposite direction.

Beyond this, we know virtually nothing about the life of Leucippus.

Already Epicurus (342/41–271/70) could venture an occasional remark to the effect that a philosopher by the name of Leucippus perhaps never existed. But Epicurus might not have been quite in earnest about it himself, considering that neither Aristotle nor Theophrastus in their reports on Leucippus' teachings show ever any slightest sign of doubt in this respect.[1]

The Life of Democritus

Much more is known about Democritus' life. One has to be careful, however, not to take everything for granted what is reported about it, particularly by late ancient sources.

No spectacular features are to be found in the life story of this quiet, unobtrusive scholarly and artistic mind.

Democritus' wealthy father is said (Diog. Laert. IX 34) to have entertained in his home in Abdera the Persian king, Xerxes, when in 480 B.C. the Persian army invaded Greece. If indeed Democritus was born in 493, this must have been quite an experience to the thirteen years old boy. On the basis of this chronology, also the report thereon in Diogenes Laertius need not be brushed aside as a mere fabrication. It might perhaps be doubtful, though, that young Democritus should have been taught "theology and astrology" by Persian and Babylonian priests ("Magi" and "Chaldaei") whom Xerxes allegedly left at the boy's father's as teachers and educators (Ξέρξου τοῦ βασιλέως τῷ πατρὶ αὐτοῦ ἐπιστάτας καταλιπόντος). (Why, incidentally, should this not have been possible?) But, at any rate, that whole exciting experience must have mightily widened the horizon of the ingenious youngster and contributed to his later desire to travel for the sake of learning.

Later on, Democritus approached (παρέβαλε) Leucippus who seems to have come to Abdera either directly from Miletus or on his way back from Elea in Southern Italy. This meeting with the initiator of atomism was in any respect decisive for the development of the young man.

Afterwards, obviously allured by the fame of the great Clazomenian, Democritus went to Athens, eager to approach Anaxagoras and be admitted to the selected group of his auditors. But when Anaxagoras,

[1] The controversy (from 1880 to 1921) among philologists about that remark by Epicurus – with Erwin Rohde, Diels, Tannery, Burnet, Nestle, Brieger, Bokownew, Praechter, Howald as the protagonists in the fight – is philosophically irrelevant, strictly speaking, although interesting from other points of view.

presumably remembering his bad experience with that other young man from abroad, Empedocles, did not accept him as a disciple, Democritus left his homeland for many years to travel in many far away lands, such as Egypt, Aethiopia, Babylon, Persia, and perhaps even India, anxious to learn and learn and learn, in order to become the greatest scholar of his time and thus, if any possible, to excel and eclipse that man from Clazomenai who had rejected him as a pupil. Only from this lifelong grudge can one understand that slur of plagiarism he cast on Anaxagoras (cf. p. 289f.).

There are some sentences allegedly written by Democritus boasting of his having achieved this goal:

> I, however, of all men of my time have traveled most extensively on earth, making the most far-reaching inquiries, and have seen the most climates and lands, and have listened to the greatest number of learned men, and in composition of lines with proof nobody has ever surpassed me, not even the so-called Arpedonaptae ("rope-tiers," meaning surveyors of land) of the Egyptians; with these, however, after all those others, I was living together for five years.
>
> ἐγὼ δὲ τῶν κατ' ἐμαυτὸν ἀνθρώπων γῆν πλείστην ἐπεπλανησάμην ἱστορέων τὰ μήκιστα καὶ ἀέρας τε καὶ γέας πλείστας εἶδον καὶ λογίων ἀνδρῶν πλείστων ἐπήκουσα καὶ γραμμέων συνθέσιος μετὰ ἀποδείξεως οὐδεὶς κώ με παρήλλαξεν οὐδ' οἱ Αἰγυπτίων καλεόμενοι Ἀρπεδονάπται· σὺν τοῖς δ' ἐπὶ πᾶσιν ἐπ' ἔτεα πέντε ξυνὸς ἐγενήθην.[1]
>
> *(fr.299) Clem. Strom. I 15, 69;*

These sentences are conspicuously at variance with Democritus' usual modesty and for this reason, although not for this reason alone, are considered spurious by quite a few scholars. But there are also those who cast their votes in favor of this fragment, as e.g. Theodor Gomperz, E. Meyer, Eisler, Capelle, and most recently the late Italian mathematician and physicist Federigo Enriques in his outstanding book on Democritus.[2] And those sentences could indeed, at least from a purely psychological angle, very well be understood as the outburst of an otherwise quiet and sober scholar who might never in his life have got over the sting of his rejection by the greatest natural philosopher of

[1] I adopt Diels' emendation of the obviously corrupt last words of the text handed down.

[2] Federigo Enriques e Manlio Mazziotti, *Le dottrine di Democrito d'Abdera.* Prefazione del Prof. G. Castelnuovo. Bologna, 1948, p. 3.

Greece. All the more so as Democritus had been in for another disappointment. For when, overflowing with knowledge after so many years of traveling abroad, he finally came back to the place of his frustration, eager to show that he had been wronged and would have been well deserving of being admitted into that circle of the selected, he was to learn that there was in Athens neither Anaxagoras any more nor anybody else who would have known or remembered Democritus:

> For I came back [1] to Athens – and there was not one person there to know me!
>
> ἦλθον γὰρ εἰς Ἀθήνας καὶ οὔ τίς με ἔγνωκεν.
>
> *fr. 116 (Diog. Laert. IX 36).*

He then finally returned to his hometown Abdera in Thracia to settle there for the rest of his long life and started an amazingly successful career as a writer and teacher.

Incidentally, there are reports (Diog. Laert. IX 50 [80A1]; Athen. VIII 354C [68A9], a.o.) to the effect that one of the students of Democritus was another native of Abdera who was to become famous: Protagoras. These statements are usually discarded for reasons of chronology since Protagoras is supposed to have been born about 481 or 480 B.C. If Democritus was born in 460, Protagoras could not very well have been a disciple of his.

The corrected date of Democritus' birth, 493 B.C., delivers us also from rejecting rather arbitrarily and without convincing reasons the clear and sober statements about the relationship of the two famous Abderites.

The Writings of Democritus

The beginning of Democritus' literary activity could hardly be later than about 440 B.C. For to gather from a remark in Aristotle (De partt. anim. I 1. 642a24ff.), at least the first philosophical works of Democritus must have been written before the time when Socrates began teaching. (Also for this reason is it rather impossible to stick to 460 B.C. as the year of Democritus' birth.)

Democritus was an incredibly many-sided researcher and extremely prolific writer. His literary skill, his mastery of the most various sorts of style, his clearness and lucidity were highly praised and favorably compared with the literary mastership of Plato to whom he was by all

[1] ἔρχομαι can also mean "to come back." See any dictionary.

means superior in knowledge. Even though, as was assumed in antiquity already, part of the numerous works circulating under Democritus' name were written by adherents of his school and not by him, the range of subject-matters he himself dealt with remains stupendous, comprising works on ethical, physical, mathematical, musical topics and topics of the applied sciences and the arts, such as medicine, agriculture, painting, military sciences, etc. etc. And one can very well understand the enthusiastic exaggeration of Diogenes Laertius (IX 43) in calling him "the omniscient Democritus" (παντοδαὴς Δημόκριτος).

The works going under Democritus' name were intensively studied by the Alexandrian philologists and later also by the Romans. All the writings, extant at that time, of Democritus and the Democriteans were arranged into thirteen tetralogies and a group of unconnected treatises, if not earlier, at latest by the grammarian Thrasyllos, a contemporary of Tiberius'. The list of the works as given in Diogenes Laertius (IX 45ff.) goes back to this arrangement.

More than threehundred fragments of writings allegedly by Democritus have survived. Two hundred and ninety eight are said to be genuine, the rest is considered spurious.

Among those passing on the whole for genuine, there is a group of 129 fragments handed down as quotations in Stobaeus (frr. 169–297) and a group of 81 (frr. 35–115) going under the name of "Democrates." Scholars such as v. Arnim and H. Laue have contested the identity of Democrates with Democritus, while Diels and others have maintained it. Both groups of fragments contain almost exclusively sentences on moral subjects, maxims for the conduct of a reasonable life, practical advices, without any theorizing and, at any rate, without any connection with the doctrine of atomism.

There is an obvious difference between the two groups, and it might be wise to listen to the judgment of one of the recent philological experts:

> One will have to put up with the necessity of considering the "C.D." (Corpusculum Democratis, B35–B115) a particularly worn-out inferior second- or thirdhand work in which only the most banal things in linguistically corrupt form (cf. B36) and with dissolution of all articulation of the original have been handed down. All interpretation will always have to proceed from Stobaios.[1]

[1] Hermann Langerbeck, "Δόξις 'Επιρυσμίη. Studien in Demokrits Ethik und Erkenntnislehre." Berlin, 1935. (*Neue Philologische Untersuchungen*, Heft 10),

Basic Principles of Democritean Ethics

Accepting this advice, we shall indeed follow the Stobaeus quotations rather than the maxims of "Democrates" when trying to get a short glimpse into what is called Democritus' ethics before proceeding to what interests us most, a reconstruction of the main features of the atomistic doctrine.

The field to which the ethics of Democritus refers is rather narrow. His advice constitutes neither any ethics concerning man's behavior toward subhuman nature nor, to any considerable extent, an ethics of man's living together with his fellow-men. Democritus' ethics is mainly concerned with man's behavior toward himself as an individual person with regard to enjoyment and grief, pleasure and displeasure. It would almost be preferable to speak here rather of mere biotics, or art of living, than of ethics. It is, at any rate, not ethics in the sense of norms, but merely of good advices.

One should draw a distinction between "intuitionism" and "hedonism," with intuitionism meaning any ethics that pronounces its norms as something "self-evident" to be observed for their own sake, while any ethics based on, and substantiated by, facts of the will and the natural drives would be hedonism. According to this distinction, Democritus is a hedonist and a strict opponent of any intuitionism.

He recommends moderation in enjoyment lest from immoderateness displeasure may arise afterwards. Not perhaps because self-conquest, self-control, as such is meritorious or praiseworthy for its own sake is it recommended, but because moderate indulgence, though less intensive, is lasting longer and entails less sacrifices for the future. If, however, self-conquest is not rewarded in this way later on, then it is a useless evil that we inflict upon ourselves.

Therefore, according to Democritus, also a "too little" of enjoyment (τὰ λείποντα) shall be avoided. For otherwise one will be sorry subsequently for having missed an enjoyment. In other words, self-control is neither noble nor vulgar, but is practiced only for the sake of subsequent pleasure. Hence, if one gets too little enjoyment it is mere miscalculation.

That is why one shall strive for the middle-of-the-road behavior, or

p. 13: "Man wird sich damit abfinden müssen, im C.D. (*Corpusculum Democratis, B35–B115*) ein ganz besonders abgegriffenes Machwerk zweiter oder dritter Hand zu sehen, das nur das Banalste in sprachlich entstellter Form (*vgl. B36*) und mit Auflösung aller Gliederung seiner Vorlage erhalten hat. Die Interpretation wird immer von Stobaios ausgehen müssen."

metriotes (μετριότης, "moderation," "appropriateness"). Only for this reason, the middle of the road is recommended, not for its own sake:

> For man joy arises from moderation in indulgence and harmony of life. The "too little" of enjoyment as well as the "too much" of enjoyment (is bad because it) uses to turn around and engender great suffering (literally: great motions) in the soul.
>
> ἀνθρώποισι γὰρ εὐθυμίη γίνεται μετριότητι τέρψιος καὶ βίου ξυμμετρίῃ, τὰ δὲ λείποντα καὶ τὰ ὑπερβάλλοντα μεταπίπτειν τε φιλέει καὶ μεγάλας κινήσιας ἐμποιέειν τῇ ψυχῇ·
>
> *fr. 191 (Stob. flor. III 1, 210).*

Democritus chooses not the deepest enjoyment, but the most lasting and the most frequently recurring enjoyment. What he teaches is an art of measuring pleasures. He takes the measurements of the pleasures, and this can lead to inner conflict and to self-conquest. Hence,

> for man it is the best to live his life so as to enjoy most and miss the least.
>
> ἄριστον ἀνθρώπῳ τὸν βίον διάγειν ὡς πλεῖστα εὐθυμηθέντι καὶ ἐλάχιστα ἀνιηθέντι.
>
> *fr. 189 (Stob. flor. III 1, 47).*

Accordingly, already Democritus points out certain hedonic "virtues," or acquirable human qualities which make one particularly capable of achieving the greatest possible gain in enjoyment. Here belong especially peace of mind, *ataraxie* (ἀταραξίη), and the insight that peace of mind is necessary for the furtherance of enjoyment, and fearlessness, *athambie* (ἀθαμβίη). And also intellect, *phronesis* (φρόνησις) belongs here, but not because it would have to tell us what is good and what is bad, but just because measuring requires an ability of avoiding miscalculations. That is why also the intellect measuring and estimating the pleasures is a virtue in the service of hedonics:

> But (he says) that it (sc., joy, cheerfulness) consists in the distinction and judging of the pleasures, and that this is the nicest and most advantageous thing to man.
>
> συνίστασθαι δ' αὐτὴν (sc., εἰθυμίην) ἐκ τοῦ διορισμοῦ καὶ τῆς διακρίσεως τῶν ἡδονῶν καὶ τοῦτ' εἶναι τὸ κάλλιστον καὶ συμφορώτατον ἀνθρώποις.
>
> *Stob. II 7, 3; A167.*

Why 'Corpus "Democriteum"'?

As early as the fourth century B.C., the writings of all the Atomists seem to have been united into a *Corpus Democriteum* comprising not only the writings of Leucippus and Democritus but also of other adherents of the atomistic doctrine, without any distinction between the contributions of the original authors. The common doctrine was just labelled "Democritean."

The question has been raised why the common atomistic doctrine was labelled with the name of the disciple and not of the teacher. Why "Democritean," and not "Leucippean"?

Various answers have been given.

Paul Deussen, in his *Allgemeine Geschichte der Philosophie* (II, 1), has suggested Leucippus might only have taught orally without putting anything down in writing, just as Socrates or Jesus or Kapila for that matter. Supposing this were true, then the fact that in Aristotle and Theophrastus certain writings are attributed to Leucippus could lend support to the witty remark by Tannery (Revue d. étud. grecq. X [1897] 127) that those works were in fact written by Democritus and that "Leucippus" was his pseudonym in the beginning of his literary career.

Most convincing, however, appears to be an attempt at explanation by Julius Stenzel. Inspired by certain findings in Werner Jaeger's *Studien zur Entstehungsgeschichte der Metaphysik des Aristoteles*, Stenzel (in Pauly-Wissowa, *Real-Enzyklopädie*, Art. "Leucippus") points at the difference between, as we should say, textbooks written for the use in school and published works written "with all the charm of literary formation, destined to impress the reading public at large." Exactly this applies to what Democritus was doing. His writings were published literary masterpieces, whereas any writings by Leucippus were merely meant for use in the classroom. "The fight between school-papers and brilliant literary products is too unequal for us to be astonished at the complete displacement of Leucippus."

Therefore, the elusive problem of what in the atomistic doctrine is specifically Leucippean and what specifically Democritean appears to be virtually insolvable, and the only thing to derive comfort from is the insight that the whole question is after all not so important, philosophically.

THE ATOMISTIC DOCTRINE

Let us, then, forget about the interesting philological and literary problem of what exactly should be attributed to Leucippus and what to Democritus. Following the example of later antiquity, we are going to call the common atomistic doctrine just "Democritean." One has to be careful, however, not to jumble up the genuine atomistic doctrine and its Epicurean form, or rather deformation.

'Symploke' and 'Periplexis'

Shape and size of certain ultimate particles in a vacuum, separated that is from each other by empty interstices, this is the unchangeable proper, according to Democritus. In other words, he keeps to the geometrical side.

This implies two things:

So unchangeable claims Democritus are shape and size that those ultimate particles cannot be physically divided any more.

Take, *e.g.*, an octahedron. One could certainly quite well imagine that, although its shape and size are unchangeable, the octahedron nevertheless could be split physically. It is unchangeable, but it is divisible. This, however, is rejected by Democritus. In his insistence on unchangeability he goes so far as to exclude divisibility, either. This is one thing.

The other is the following:

Supposing such an ultimate particle to be, say, a cube of a certain size. One could then imagine one or several or all of the six sides of the cube as getting covered with other cubes which then would stick by way of adhesion. Into the gaps coming about in this way other cubes could be fitted which then likewise would be kept there by adhesion. In this case, shape and size of the individual cubes would still be unchanged, but the cubes would be capable of growth through apposition.

According to Democritus, however, this, too, shall not be. He expressly rejects both such a division and such a growth:

> Leucippus as well as Democritus of Abdera . . . say that the first quantities (*i.e.*, the ultimate units of matter, as we should say) are infinite in multitude, but in size (physically) indivisible, and that neither from one quantity do many quantities arise (*i.e.*, they cannot be split) nor does one arise from many (*i.e.*, they cannot be enlarged through apposition), but that all things are brought about by way of their (sc., the atoms') plaiting and circumplaiting.
>
> Λεύκιππός τε καὶ Δημόκριτος ὁ 'Αβδηρίτης . . . φασὶ γὰρ εἶναι τὰ πρῶτα μεγέθη πλήθει μὲν ἄπειρα, μεγέθει δὲ ἀδιαίρετα, καὶ οὔτ' ἐξ ἑνὸς πολλὰ γίγνεσθαι οὔτε ἐκ πολλῶν ἕν, ἀλλὰ τῇ τούτων συμπλοκῇ καὶ περιπλέξει πάντα γεννᾶσθαι.
>
> *Arist. de caelo III 4. 303a5; 67A15.*

"All things are brought about by way of plaiting and circumplaiting." What does that mean?

The atoms are not able to grow through apposition, though. But they are capable of aggregation:

The atoms have all kinds of shape. Supposing, then, an atom have the shape of a longish, thin, crooked wire. When two such atoms meet, they can hook into each other and then will remain caught by each other. That is what the Atomists call *symploké* (συμπλοκή), "plaiting."

Here, too, the result is growth. But this is not growth through any power of attraction, by way of adhesion, in an attachment of plane to plane. It is, instead, a growing by two atoms being caught mechanically that can be released again. This kind of growth comes about neither by any distance operation nor any operation from near, but by *symploké*, by mutual hooking.

And then, all around the surface of such a lump of two, still more atoms can hook, thus enlarging the aggregate ever more. This is called *periplexis* (περίπλεξις), "circumplaiting." In this way, by mutual mechanical attachment, the larger aggregates, even whole celestial bodies, take origin.

All this comes about, not by attraction from far (gravitation) or from near (adhesion), but only by *symploké* and *periplexis*.

The Giant-Atoms of Democritus

Dionysius of Alexandria, in his writing *Peri Physeos* as quoted in Eusebius, makes a highly interesting statement about the Democritean atoms:

> However, they (sc., Epicurus and Democritus) disagreed insofar as the one (sc., Epicurus) assumed that all the atoms are of utmost smallness and for this reason imperceptible, while Democritus (assumed) that there are also certain atoms of gigantic size. But both declare that there are atoms and that they are called so because of their insoluble solidity.

> τοσοῦτον δὲ διεφώνησαν (sc., Ἐπίκουρος καὶ Δημόκριτος) ὅσον ὁ μὲν ἐλαχίστας πάσας καὶ διὰ τοῦτο ἀνεπαισθήτους, ὁ δὲ καὶ μεγίστας εἶναί τινας ἀτόμους ὁ Δημόκριτος ὑπέλαβεν. ἀτόμους δὲ εἶναί φασιν ἀμφότεροι καὶ λέγεσθαι διὰ τὴν ἄλυτον στερρότητα.
>
> *Dionys. ap. Euseb. P.E. XIV 23, 2. 3; A43.*

If this passage is reliable – and there is no good reason for doubt since what it says is by no means absurd – Democritus would have taught that most of the atoms are invisibly small, but that there are also very big ones, the cause of their being "indivisibles" (*atomoi*) lying in their "insoluble solidity," not in their smallness.

Philosophically, this is very significant. If, namely, one says the atoms are infinitely small, then the question is provoked: Why? If, however, they have all possible sizes, it is quite a different story. And the same it is if one assumes that the atoms are round like balls. Again one could legitimately ask: But why? According to Democritus, however, the atoms have all shapes possible. Which, incidentally, is nothing new with Democritus since already Anaxagoras had the same sagacity (cf. p. 269). At any rate, Democritus, too, was a keen thinker in this respect and thus got away from the question of why the atoms should be so small that they cannot be seen. Well, there are also big ones. These then are the nuclei of stars. And that is what Epicurus did not understand and with him all those who even today are still at a loss to know how to interpret that startling report about the giant-atoms of Democritus.

Fundamentals of Democritean Atomism

The cardinal features of genuine (not Epicurean) atomism have been described by a number of ancient authors, above all Aristotle. But one could hardly find a more succinct and precise description than the one given by that same Dionysius of Alexandria [1] already mentioned. Although he lived much later, the statements in his anti-Democritean and anti-Epicurean writing *On Nature* (Περὶ Φύσεως) – of which a great part has been handed down by quotations in Eusebius – are more to the point than even those in Aristotle. This is Dionysius' report:

> Those, namely, who call "atoms" certain undestroyable and smallest corpuscles of innumerable multitude and plead (the existence of) something like an empty space of infinite largeness, declare indeed that these atoms by moving in scattered paths in the vacuum, by colliding with each other automatically (*i.e.*, with their own velocities) in consequence of the hazard of the directions of their paths, and by mutually plaiting due to the variety of their shapes, get caught by each other and in this way bring about the world and its contents, or rather an infinite multitude of worlds. Such has been the opinion of Epicurus and Democritus.

[1] Dionysius the Great (ca. end of 2nd cent. – 264 or 265 A.D.), a disciple of Origen, since 231 head of the Catechist School, since 248 bishop, of Alexandria.

> οἱ μὲν γὰρ ἀτόμους προσειπόντες ἄφθαρτά τινα καὶ σμικρότατα σώματα πλῆθος ἀνάριθμα καί τι χωρίον κενὸν μέγεθος ἀπεριόριστον προβαλόμενοι, ταύτας δή φασι τὰς ἀτόμους ὡς ἔτυχεν ἐν τῷ κενῷ φερομένας αὐτομάτως τε συμπιπτούσας ἀλλήλοις διὰ ῥύμην ἄτακτον καὶ συμπλεκομένας διὰ τὸ πολυσχήμονας οὔσας ἀλλήλων ἐπιλαμβάνεσθαι, καὶ οὕτω τόν τε κόσμον καὶ τὰ ἐν αὐτῷ, μᾶλλον δὲ κόσμους ἀπείρους ἀποτελεῖν. ταύτης δὲ τῆς δόξης Ἐπίκουρος γεγόνασι καὶ Δημόκριτος.
>
> *Dionys. ap. Euseb. P.E. XIV 23, 2. 3; A 43.*

"In scattered paths" is here the rendering of the Greek ὡς ἔτυχεν (*hos étychen*) which literally means "just as it happened to occur." If the atoms are moving in straight lines – and there is indeed no reason for imagining it otherwise – they can be arranged in parallel paths in the same direction or in opposite directions or, as well, the ones as going east-west and others north-south or, also, under all angles possible, that is: in perfectly scattered paths. This latter expression renders best the meaning of *hos étychen*. Parallel paths, convergent paths, divergent paths, paths perpendicular to each other, paths perpendicularly intersecting – all these would mean certain arrangements, they could not be designated as *hos étychen* any more. Therefore: "in scattered paths."

"Automatically," "by themselves," αὐτομάτως (*automátos*), implies "by their own velocities." That is to say, their velocities are not transmitted to the atoms by anything else, but belong to the individual atoms just as do shape and size. This means the contrast to any powers operating from far. For if an atom were attracted from far, one could not say any more that it moves *automátos*, "by itself," because then it is moved by gravity. And the same it is if an atom is pushed, having been at rest before (cf. Simpl. phys. 42, 10; A 47). For then it moves due to the push, and not "by itself." Thus, there is no other interpretation of *automátos* possible but to take it as meaning, "by self-velocity," "by their own velocities" belonging to the atoms from all eternity. This conception of motion as a fundamental property of the atom was not

comprehended by all those who, as, *e.g.*, Aristotle, have blamed Democritus for not having explained "about motion wherefrom and how things have got it" (περὶ δὲ κινήσεως, ὅθεν ἢ πῶς ὑπάρχει τοῖς οὖσι . . . [Metaph. I 4. 985b19; 67A6; cf. also XI 6. 1071b31]).

"In consequence of the hazard of the directions of their paths" is meant to render διὰ ῥύμην ἄτακτον (*dia rhymen átakton*). Literal translation would be, "by unregulated impetus." Since there is no reason whatsoever for supposing here any crooked paths, *rhyme* is meant as rectilinear and corresponds to the push momentum *mc*, obviously. In other words, it is the quantity of motion in the moment of collision. When two atoms meet they have each a certain *mc*, or *rhyme*. And this *rhyme*, then, is here called "unregulated." In what respect can it be unregulated? The two *mc*'s are certainly not unregulated concerning the *m*, for the *m* coincides with the volume. Neither are they unregulated as to the *c*. Consequently, it is only concerning their directions that they are unregulated. And this is also perfectly in keeping with the statement about the scattered paths. "By unregulated impetus" just means, "by push from incalculable directions," in other words: by the hazard of the directions of their paths.

Exactly this, however, is decisive. For the question has been: Do the atoms meet because they attract each other or because their paths happen to intersect each other? And Democritus' answer is: They meet *hos étychen* and *dia rhymen átakton*.

The hooking into each other of the atoms (*allelon epilambánesthai*, ἀλλήλων ἐπιλαμβάνεσθαι = "to be caught by each other") is ascribed by Dionysius to the variety of their shapes. This is a little mistake. Mere variety would explain nothing. Decisive for their getting caught by each other is that there are also atoms of intricate shapes: rugged atoms (σκαληνά), hook-shaped atoms (ἀγκιστρώδη), hollow atoms (κοῖλα), crooked atoms (κυρτά), etc. (cf. Aristotle, *De Democrito* [fr. 208 Rose], apud Simpl. de caelo 294, 33 ff.; A 37).[1]

Some Momentous Consequences

Democritus, then, assumes that any atom is moving in a rectilinear path until another atom comes across. If the two colliding atoms have simple shapes, they will rebound from each other. If they have complicated forms, they will hook into each other, be caught by each other, and stay together.

[1] Another little mistake is that Dionysius says his description applies also to Epicurus' atomism which, however, in decisive points is quite different and in fact rather naive, not to say ridiculous.

Therefrom follows the infinity of space. This is a simple consequence of the fundamental idea of free, rectilinear motion for every atom with a velocity of its own. If one assumes rectilinear motion, space must be infinite. For otherwise one would have to assume also something like a tin box around the world against which the atoms would dash to come back again.

Furthermore, having assumed an infinity of space, Democritus had also to counterbalance this infinity with the assumption of an *infinite number of atoms*. For if there were only a finite number of atoms, they would spread so thinly in the infinite space that of the whole world finally nothing would be seen any more.

Thus, from rectilinear motion follows the infinity of space, and therefrom the infinite quantity of the atoms. And in an infinitely large space with infinitely numerous atoms, there is, of course, also room for *infinitely numerous worlds*.

That Democritus did assume an infinite number of worlds has been stated by various ancient authors.

He was not the first to make such an assumption. An infinite (though not empty) space with an infinite number of worlds in it had been taught already by Anaximander and Anaxagoras. Yet, there is a significant and fundamental difference. With Anaximander, as is expressly stated (cf. p. 157), those infinitely numerous worlds are equidistant from each other, and they arise, grow, and perish simultaneously, in a, so to speak, synchronized periodicity. And the same holds true, obviously, of the innumerable worlds of Anaxagoras. But with both Anaximander and Anaxagoras, there is a godhead governing the universe: the divine Apeiron "steering" everything or the World-Nous by whom "all has been arranged." With Democritus, however, there is nothing of the kind. The universe of Democritus is not the work of the all-governing will of any godhead. His universe is as it is,

> having in no way been engineered by anybody,
>
> . . . διὰ τὸ μηδαμῶς ὑπό τινος αὐτὸ δεδημιουργῆσθαι.
>
> *Pseudo-Plutarch. Strom. 7; A 39.*

Accordingly, those infinitely numerous worlds of the Democritean universe look completely different from those of Anaximander or Anaxagoras:

(Democritus has taught) that there are infinitely numerous worlds that are also different in size; that in some of them there is neither a sun nor a moon, while in others there are both, but larger than those with us, and in still others, several (suns and moons). (He says, furthermore,) that the distances between those worlds are unequal and that in one part (of the universe) there are (relatively) more worlds, in another part, fewer worlds, and that some of them are growing, some in their culmination, some perishing, and that in one place some (worlds) are taking origin, while in another place some are in the process of fading out. (He says) that they (sc., the worlds) are destroyed by each other by way of bursting upon (each other). (He declared also) that some worlds are void of animals and plants and of any moisture. . . . (He says) that a world stays in its culmination until it cannot any more get anything additional in from outside.

ἀπείρους δὲ εἶναι κόσμους καὶ μεγέθει διαφέροντας. ἐν τισὶ δὲ μὴ εἶναι ἥλιον μηδὲ σελήνην, ἐν τισὶ δὲ μείζω τῶν παρ' ἡμῖν καὶ ἐν τισὶ πλείω. εἶναι δὲ τῶν κόσμων ἄνισα τὰ διαστήματα καὶ τῇ μὲν πλείους, τῇ δὲ ἐλάττους καὶ τοὺς μὲν αὔξεσθαι, τοὺς δὲ ἀκμάζειν, τοὺς δὲ φθίνειν, καὶ τῇ μὲν γίνεσθαι, τῇ δ' ἐκλείπειν. φθείρεσθαι δὲ αὐτοὺς ὑπ' ἀλλήλων προσπίπτοντας. εἶναι δὲ ἐνίους κόσμους ἐρήμους ζῴων καὶ φυτῶν καὶ παντὸς ὑγροῦ. . . . ἀκμάζειν δὲ κόσμον, ἕως ἂν μηκέτι δύνηται ἔξωθέν τι προσλαμβάνειν.

Hippolyt. refut. I 13, 2ff; A 40.

(Also these infinitely numerous "worlds" are, of course, merely spatial parts of one and the same world, and not a plurality of worlds in the modern sense.)

Constant and Never Lost Velocities

The velocities of the atoms have to be realized as constant. For since no attraction from far is assumed by Democritus, there is, of course, no reason for constructing an acceleration of the velocities. Acceleration would only be possible if there were at least two atoms attracting each other. But here each atom is freely, independently moving by itself. Hence one may safely gather that Democritus considered the velocities constant.

But could velocities not get lost under certain circumstances? When atoms of complicated shapes collide and are caught by each other, one could quite well imagine that as a consequence of the collision velocities

become zero. Democritus, however, is said to have declared that this never takes place, but that the atoms move eternally, in other words, that they not only have their own velocities, but also that these velocities can never get lost:

But similarly to Leucippus, he (sc., Democritus) teaches about elements, the filled and the empty, calling the filled "being," the empty "not-being." He expressed himself, however, in such a way that (one can gather that) the "beings" (sc., the atoms) are moving in the empty (space) *eternally*.

λέγει δὲ ὁμοίως Λευκίππῳ περὶ στοιχείων, πλήρους καὶ κενοῦ, τὸ μὲν πλῆρες λέγων ὄν, τὸ δὲ κενὸν οὐκ ὄν· ἔλεγε δὲ ὡς ἀεὶ κινουμένων τῶν ὄντων ἐν τῷ κενῷ.

Hippol. ref. I 13, 2; A 40.

That would mean that not only atoms of simple shapes will rebound from each other keeping their velocities, but that also the velocities of atoms hooking into each other are not reduced to zero, because these atoms will spin around each other, in an eddy, a δίνη (*dine*), in which the constant velocity of each will take effect as a component.

The statement that motion cannot get lost is seemingly contradicted by a passage in Aetios:

According to Democritus, in the beginning the earth was wandering about (in the world) in consequence of its smallness and its small weight. But when in the course of time it became dense and heavy, it stopped.

Δημόκριτος κατ' ἀρχὰς μὲν πλάζεσθαι τὴν γῆν διά τε μικρότητα καὶ κουφότητα, πυκνωθεῖσαν δὲ τῷ χρόνῳ καὶ βαρυνθεῖσαν καταστῆναι.

Aet. III 13, 4; A 95.

At a hasty glance, this would seem to indicate that, in Democritus' opinion, motion can indeed get lost.

Yet, it would be utmost superficiality to interpret the passage in this way. For what is meant here is merely a discontinuation of translatory movement. An aggregate such as the earth can, of course, come to a standstill although its ultimate particles are swinging, each spinning around its place. A standstill of the earth does not imply that also the atoms of the earth stop moving. Vivid internal motion is very well compatible with rest in its place of an aggregate. The ultimate particles just do not leave a certain narrow motion district despite their vivid

movement. The whole earth, even, could rotate around an axis and nevertheless be said to stand still, if only the axis of the earth stand still. At any rate, that passage is no counter-evidence, except to those who confound aggregate with atom.

Relation between Velocity and Size

That same passage in Aetios, however, does mean that Democritus allegedly realized the "heavy" atoms as slower which would imply that he assumed "heaviness" and "lightness" without attraction from far. Would that not be sheer nonsense? – Not necessarily:

Powers operating from far being excluded, the terms "heavy" and "light" could still be meaningful if understood in relation to an effect by contact, and not to an effect by attraction. Each individual atom having its own self-velocity, the decisive difference would be in the behavior at contact. And according to their different behavior when colliding, the atoms could be called "light" or "heavy."

Incidentally, one has to draw a strict distinction in this respect between Democritus and Epicurus. Adopting Democritean atomism without real understanding and out of ulterior motives that have nothing to do with any genuine interest in natural philosophy, Epicurus just bowdlerizes the theories of Democritus. Epicurus' assumption of atoms of different sizes that are "falling" with equal velocity parallel "downwards" (when there is not yet an earth, even!) and then collide, deviating all of a sudden a little bit from the parallel direction "without any cause" (ἀναιτίως), and thus bring about the origination of the worlds – such an hypothesis is too childish indeed to be compared in earnest with the doctrine of Democritus according to which the atoms are moving by themselves in blindly scattered paths, with gravitation not as a primary property, but as a secondary result to be derived from the collisions. To Democritus, the atoms are weightless to each other as long as they are at a distance, and the difference between "heavy" and "light" manifests itself only at a collision and through the collision.

This Democritean idea of gravitation not as primary property but as to be explained secondarily by the pushing of freely moving atoms was not easy to understand in antiquity. In a passage in Aetios, *e.g.*, it is correctly stated that

> Democritus says that the primordial corpuscles – these, namely, were (what he calls) "the solids" – do not have any weight,
>
> Δημόκριτος τὰ πρῶτά φησι σώματα (ταῦτα δ' ἦν τὰ ναστά) βάρος μὲν οὐκ ἔχειν,

then, however, Aetios continues the sentence:

> but that they (sc., the primordial corpuscles) are moved by way of mutual push (*i.e.*, collision) in the infinite (space),
>
> κινεῖσθαι <δὲ> κατ' ἀλληλοτυπίαν ἐν τῷ ἀπείρῳ,
>
> *(Aet. I 12, 6; A 47).*

as if their motions were to originate from their collisions – which is pure nonsense, of course – while the true Democritean meaning could only have been that it is the movement of "weight," βάρος, gravitation, that comes about by "mutual push." And still grosser is the misunderstanding in Simplikios when he contends that

> Democritus who teaches that by nature the atoms are without motion declares that they are moved by a push,
>
> Δημόκριτος φύσει ἀκίνητα λέγων τὰ ἄτομα πληγῇ κινεῖσθαί φησιν,
>
> *(Simpl. phys. 42, 10; A 47).*

which is no less nonsensical. Where shall the push come from?

Gravity not being a primary property, it would be important to find out the relation between velocity and size. Velocity is constant, though, but it is not equal for all atoms, and there must be a relation of the velocity to the size of an atom.

This is not easy to determine. For what has been handed down is only the relation of the "weight" to the size, as, *e.g.*, in Aristotle:

> And yet Democritus says that the individual atom is heavier in correspondence with the greater volume.
>
> καίτοι βαρύτερόν γε κατὰ τὴν ὑπεροχήν φησιν εἶναι Δημόκριτος ἕκαστον τῶν ἀδιαιρέτων.
>
> *Arist. de gen. et corr. I 8. 326a9; A 60. (Similarly also de caelo IV 2. 309a 1.).*

That is to say: the bigger the atom, the heavier.

But this would not yet indicate anything about velocity. For being heavier is not implicitly tantamount to running faster. Only in filled space the heavier thing falls with greater velocity, whereas in a vacuum the velocity of falling would be equal for all things. Thus, the answer to the question is at any rate no obviousness.

When looking for an answer, we find that the fragments and reports handed down fail us. Democritus himself no doubt gave the reasons for

his statements. The reporters, however, give almost never an account of those interesting reasons, but quote the statements just doxographically or merely with their own comments and counter-arguments. Therefore, we have to become "selves upon ourselves" and must find out the relation according to Democritus between velocity, weight, and size by way of deduction.

There are three cases possible: (1) Either all atoms have equal velocities or (2) the "heavier" atoms are quicker or (3) the "heavier" atoms are slower.

(1) Supposing all atoms to have equal self-velocities and when two atoms collide, in the collision the one manifests itself as heavier, the other as lighter. This would not mean that the "heavier" atom has attracted the "lighter" one. It can at best only mean that the "heavier" atom has a greater motion resistance, which is to say that it cannot so quickly be pushed back as the "lighter" one. "Heavy" would then mean: "performing a greater motion resistance." In the case of collision, the heavier atom is that which suffers a loss in velocity, and the lighter that which has a gain in velocity.

But then we have already got into absurdities. For if by such a collision velocities are changed, the presupposed equality of the velocities of the two atoms is cancelled, and when each atom in the world has met with another atom, the general equality of the velocities has gone. The first case, therefore, is out.

(2) The "heavier" atoms are quicker. Let us suppose that the "heavier" atoms are the bigger ones, that the bigger atoms are quicker, meaning: with greater velocity moving, and that just for this reason they are called "heavier." The bigger, the quicker. In this case, when atoms collide no changes of velocity can occur. For the velocities remain proportionate to size.

This case, however, would imply, not a logical, but physical impossibility:

The atoms are supposed to form aggregates and, by aggregation, even celestial bodies. Since there are differences in velocity, atoms will not only meet by themselves and so aggregate, but will also be driven into aggregation, and it is obvious that only the slower atoms can be driven together into aggregation by the quicker atoms. The quicker ones are those which do the driving. According to this mechanics, the celestial bodies would have to consist of air and ether since these have the smallest, *ergo* slowest atoms . . .

(3) Hence only the third case is left: The bigger atoms are the slower

ones, "heavy" means "moving slowly," velocity is inversely proportionate to size.

We remember that report in Aetios to the effect that Democritus taught the earth was wandering about originally and came to a standstill later when it had become bigger and "heavier." This would from the outset have been a hint pointing to the third case.

The Four Arguments in Favor of Atomism

As can be learned from a report in Aristotle, the Atomists have also advanced a number of arguments to corroborate their hypothesis of the existence of atoms and "the empty." In a passage of 18 lines (Phys. IV 6. 213b4–22), Aristotle discusses four such arguments. The same four arguments, incidentally, are still used by the adherents of the atom hypothesis, although today there are also other ones. The gist of them is the following:

(1) If space were completely filled without empty interstices, nothing could move.

As Descartes has shown, this argument is not cogent since without void interstices there could still be motion systems forming circles, as it were, that is to say: motion systems closed in themselves. Incidentally, exactly the same idea of motion systems closed in themselves was pointed out already by Empedocles (cf. p. 330) who rejected void space (just as did Anaxagoras, cf. p. 184) even before it had been assumed (cf. p. 350).

(2) Enlargement and diminution of solids in expansion and contraction through heat and cold would not be possible unless there were empty interstices increasing and decreasing, respectively, since the atoms themselves of an aggregate can neither increase nor decrease.

(3) The growth of animal and vegetable bodies is another argument in favor of atoms with empty spaces in between. While crystals, *e.g.*, grow by simple apposition, organisms can grow without losing their shape only by way of so-called intussusception alone or by intussusception combined with apposition. For by apposition alone they would not grow bigger, but merely get a thicker skin. That organisms can only grow if particles move apart, making room in the interstices for the supervening particles of food, was clear to the Atomists already, for they argue: There must be those interstices since organisms do grow. Otherwise not the organs of an organism would grow, but merely its surface.

Toward the end of last century, this was found out quite anew by

botanists and was hailed as a terrific discovery. Yet, actually the discovery was new in the fifth century B.C.

(4) If one puts wood-ashes into a vessel, one can pour into it the same amount of water as into the same vessel when empty. Or, which means the same, ashes thrown into a vessel full of water will not make the water overflow. In general, a liquid by absorbing any soluble salts does not enlarge its volume, or, in practice, merely to a negligible extent. The Democritean explanation is that the added molecules[1] get surrounded by water atoms. Hence, the distances remain the same and only the molecules themselves, or as he would say: the atom groups, become richer in atoms. This, too, presupposes empty interstices.

The terms for "atom" are: *he átomos* (feminine!), ἡ ἄτομος, "the indivisible," *to pleres*, τὸ πλῆρες, "the full" (sc., filled with penetration resistance), *to stereón*, τὸ στερεόν, "the hard," and also *to naston*, τὸναστόν, "the dense." Empty space is called *to kenón*, τὸ κενόν, "the empty," but also *to manón*, τὸ μανόν, "the rare."

There are some other and quite interesting terms and notions. The atoms being all of the same material, all actual differences are explained by the differences in shape, *rhysmós* (ῥυσμός) of the atoms, in their concatenation, *diathigé* (διαθιγή), and in their position to each other in the concatenation which is called *tropé* (τροπή), "turning." This *tropé* appears to be a vicarious, precursory notion of what today is called "allotropic modification" or even, in organic chemistry, "metamery," or "isomery."

In Aristotle (Metaph. I 4. 985b17), these Democritean conceptions are exemplified by means of letters. A and N are different by their different *rhysmós;* AN is different from NA by different *diathigé;* and N can change into Z by *tropé*, by a mere turning around. Thus, from the same material can be formed NN or NZ or ZN or ZZ, according as the turning to each other, the *tropé*, of the letters is. And accordingly not only the appearance, but also the whole result is different in each case.

Of these terms, *diathigé* is particularly significant and telling. *Diathigé* (from *thingánein*, θιγγάνειν, "to touch") indicates that Democritus could not fit into his conception of atoms, of ultimate "indivisibles," the idea of genuine mixture, in the sense of the mixture of qualities. He, too, just as Empedocles obviously (cf. p. 345), must have balked at the idea of mutual penetration. His ultimate units, the atoms, were solids filled with penetration resistance. In other words, to him impenetrability was not a result of aggregation, but a primordial property of the atoms. Consequently, he had to insist on that those ultimate particles under all circumstances remain asunder, and that even the most intimate relationship between them was merely a touching each other, a *diathigé*, but not a mutual penetration. Accordingly, he had also to declare that any "mixture" was merely apparent, but not genuinely real:

[1] Democritus uses the term "atom" for both atoms and molecules, calling the latter "atom groups."

> Democritus' opinion is that what is called mixture comes about by way of juxtaposition of the bodies, in that those being "mixed" are divided into small particles and, by setting them side by side, produce (the appearance of the) mixing. (Accordingly,) there are he declares no truly mixed things at all, strictly speaking, but what seems to be a mixture is a mutual juxtaposition of bodies which, as to their small (particles), keep each its own specific nature that they had also before the "mixing." The appearance, however, of their getting mixed comes about (he says) because, on account of the smallness of those (particles) lying abreast of each other, the senses are not able to perceive any of them alone.
>
> Δημόκριτος μὲν οὖν ἡγούμενος τὴν λεγομένην κρᾶσιν γίνεσθαι κατὰ παράθεσιν σωμάτων, διαιρουμένων τῶν κιρναμένων εἰς μικρὰ καὶ τῇ παρ' ἄλληλα θέσει τὴν μῖξιν ποιουμένων, οὐδὲ τὴν ἀρχήν φησιν εἶναι πρὸς ἀλήθειάν τινα κεκραμένα, ἀλλ' εἶναι τὴν δοκοῦσαν κρᾶσιν παράθεσιν σωμάτων ἀλλήλοις κατὰ μικρὰ σῳζόντων αὐτῶν ἑκάστου τὴν οἰκείαν φύσιν, ἣν εἶχον καὶ πρὸ τῆς μίξεως· δοκεῖν δ' αὐτὰ κεκρᾶσθαι τῷ τὴν αἴσθησιν διὰ μικρότητα τῶν παρακειμένων μηδενὸς αὐτῶν αἰσθάνεσθαι δύνασθαι μόνου.
>
> *Alex. de mixt. 2 (II 214, 18 Bruns); A 64.*

Atom and Aggregate

The shape, or *rhysmós*, of a single atom, an "atom alone," has to be distinguished from the shape of a (whole) body, a *soma* (σῶμα), or aggregate of atoms.

While the *rhysmos* of the (invisible) single atom is unchangeable and static, the shape of an aggregate is not. Such an aggregate, or whole "body," is in a state of incessant vacillation, not to say even downright pulsation, and at least in this sense in a state of uninterrupted change, *metapipton* (μεταπῖπτον).[1] For it is composed of atoms sticking to each other (*antisterizontes*, ἀντιστηρίζοντες)[1] by way of plaiting as well as of atoms additionally joining the aggregate (*epeisiontes*, ἐπεισιόντες)[1] by

[1] Cf. fr. 9 (see p. 430f.).

way of circumplaiting its kernel. The apparent overall shape of an aggregate, therefore, is merely the resultant of a flexible *epirhysmie* (ἐπιρυσμίη) [1] or summation of the atomic shapes, or *rhysmoi*, coming about by way of the concatenation, or *diathigé*, of the many atoms of the aggregate.

'Quality-less' and 'Unfeeling'

Democritus strips his atoms of everything, except size, shape, velocity, and thorough filling with penetration resistance. Apart from these, they have no other qualities. In this sense, they are called "quality-less," *apoioi* (ἄποιοι). This, of course, is not to be taken literally. In fact, the atoms are composed of qualities of the optic and haptic fields of sensation. From the optic field size and shape and motion are taken while color is omitted, and to the haptic field belongs penetration resistance.[2]

Yet, quite apart from all that, those atoms, supposed to be quality-less, do have one quality: elasticity. If at a collision the atoms rebound from each other keeping their respective velocities, they must rebound in the sense of the elastic stroke. Otherwise, motion would little by little, and finally completely, get lost. This has been overlooked by the Atomists. And what is worse: They have also overlooked that an atom, if supposed to be a really ultimate particle, can neither be elastic nor hard.[3]

However, it would not be fair to blame particularly Democritus for that. The same mistake is prevalent even today. There are still quite a few theorists who with supposedly ultimate particles deal in a way as if these were either elastic or hard, not being aware that, if one makes ultimate atoms collide, one has to invent for them an appropriate law

[1] Cf. fr. 7 (see p. 431). Translation of ἐπιρυσμίη as *Zustrom* ("afflux") is not serviceable (Diels, Kranz). Neither is H. Langerbeck's interpretation (*l.c.*, p. 108ff.). His rendering of ἐπιρυσμίη as "Umformung," "Umgestaltung" ("transformation") is not very adequate to the meaning of the prefix ἐπι-, nor does it seem to be correct materially. For there is no transformation of the unchangeable ῥυσμοί of the atoms, but merely their summation to an overall shape of the aggregate. 'Επιρυσμίη appears to be the substantival designation of that occurrence of summation. Langerbeck's formation of the plural ἐπιρυσμίαι, as a counter-part to ῥυσμοί, does not seem to be meaningful.

[2] Strictly speaking, this is the first step in antiquity toward a distinction between primary and secondary qualities.

[3] Cf. J. Sahulka, *Erklärung der Gravitation, der Molekularkräfte, der Wärme, des Lichtes, der magnetischen und elektrischen Erscheinungen auf rein mechanischem, atomistischem Wege*. Vienna, 1907; and A. Stöhr, *Philosophie der unbelebten Materie*. Leipzig, 1907, pp. VI–VIII and 21–30.

of push. For neither the laws of the hard stroke nor those of the elastic stroke are here applicable. With the hard stroke, translatory motion is supposed to turn into heat, that is to say, into internal motion, which is nonsense with a single atom. Nor can the laws of the elastic stroke be applied according to which the previous aggregation is supposed to be restored. For a single atom is just a single atom, and not an aggregate.

The atoms, then, are called "quality-less." But, besides, they are also characterized as "unfeeling":

> What is it, after all, that Democritus teaches? (He teaches) that infinitely numerous substances indivisible and undistinguishable, but, in addition, (actually) quality-less and apathetic are moving scattered in the empty (space).
>
> τί γὰρ λέγει Δημόκριτος; οὐσίας ἀπείρους τὸ πλῆθος ἀτόμους τε καὶ ἀδιαφόρους, ἔτι δ' ἀποίους καὶ ἀπαθεῖς ἐν τῷ κενῷ φέρεσθαι διεσπαρμένας.
>
> *Plutarch. adv. Col. 8, p. 1110 F; A 57.*

"Quality-less" and "apathetic," "unfeeling," it says. This latter designation is of particular importance:

For the very first time, we have here the notion of "matter without consciousness." Democritus (or Leucippus) forms the notion of *atomoi apatheis* (ἄτομοι ἀπαθεῖς), of "unfeeling atoms," being the first to drop the idea of panzoism.

Yet, all the atoms are not "unfeeling." There is an exception: the sleek, round, spherical atoms of the fire. These spherical atoms are carriers of sensation and will.

The doctrines of Leucippus and Democritus (and later on also Epicurus) are, therefore, not exactly materialism, but pyrozoism. This is the bridge, as it were, from panzoism to materialism proper.

But at any rate, this *Weltanschauung* gives the general impression that all things come about in a mechanistical way. For consciousness hangs on the fire atoms, and not inversely. Everything is not only determined, but this determination is blind, is blind fate, inexorable necessity, *Ananke*.

Here, therefore, what the will of an individual can contribute is infinitesimal. In opposition to the sum total of external circumstances, it means no more than the self-velocity of a single atom means against the infinity of all the other atoms . . .

The Fire Atoms

Physiological life and psychological life, both covered by the term *psyche*, are bound to the round, sleek fire atoms alone, according to the Atomists.

To physiological life belong assimilation, growth, automotion, and the like, as different from consciousness, or psychological life. Both need not be combined.

By automotion is here meant the self-mobility of and in an organism. Moved and movable is everything, of course. For ultimate mobility never ceases, not even in a corpse. But then there is no organ movement, no muscular contraction any more, only the automotion of the atoms in their own places.

The Atomists had the idea that there was always one fire atom between every two other atoms of the body and that, when those fire atoms came out, the body died.

> (Leucippus and Democritus call) the spherical ones of these (sc., atoms) psyche (sc., in the sense of physiological life) because the shapes of this sort can slip through everything most easily and by being in motion themselves move all the others. For they assume that psyche is that which provides the living beings with motion. That is also why breathing (literally: inhaling) is the definition of (sc., physiological) life. For when the surrounding (air) compresses the bodies and presses out those of the (atom) shapes which by never resting themselves provide the living beings with motion, then help comes from outside insofar as at inhaling other such (atoms) enter. These, namely, also prevent those (fire atoms) present inside the living beings from being secreted (completely), by pushing back the compressing and stiffening. And there is life as long as they (sc., the fire atoms) are able to do that (*i.e.*, to come to assistance from outside).
>
> τούτων δὲ τὰ σφαιροειδῆ ψυχήν, διὰ τὸ μάλιστα διὰ παντὸς δύνασθαι διαδύνειν τοὺς τοιούτους ῥυσμοὺς καὶ κινεῖν τὰ λοιπὰ κινούμενα καὶ αὐτά, ὑπολαμβάνοντες τὴν ψυχὴν εἶναι τὸ παρέχον τοῖς ζῴοις τὴν κίνησιν. διὸ καὶ τοῦ ζῆν ὅρον εἶναι τὴν ἀναπνοήν. συνάγοντος γὰρ τοῦ περιέχοντος τὰ σώματα καὶ ἐκθλίβοντος τῶν σχημάτων τὰ παρέχοντα τοῖς ζῴοις τὴν κίνησιν διὰ τὸ μηδ' αὐτὰ ἠρεμεῖν μηδέποτε, βοήθειαν γίγνεσθαι θύραθεν ἐπεισιόντων .ἄλλων τοιούτων ἐν τῷ ἀναπνεῖν· κωλύειν γὰρ αὐτὰ καὶ τὰ ἐνυπάρχοντα ἐν τοῖς ζῴοις ἐκκρίνεσθαι,

> συνανείργοντα τὸ συνάγον καὶ πηγνύον· καὶ ζῆν δὲ ἕως ἂν δύνωνται τοῦτο ποιεῖν.
>
> *Arist. de anima I 2. 404a5; 67A28. (cf. also Arist. de resp. 4. 471b30; 68A106).*

That is to say, the very same moment when in the process of exhalation the fire atoms have got out, death would have to occur, properly. For the air outside by compressing the chest kills and, by that, makes rigid.

Hence, we live because we breathe, and not inversely. We live because fire atoms penetrate into us from outside. True, muscular contraction comes to assistance. But this, too, is only possible because there are fire atoms inside which do the contracting.

Also consciousness, or life in the psychological sense, is bound to the spherical fire atoms alone. Physiological life and psychological life need not be combined, though. Yet, to all appearances, wherever there is consciousness, there is also physiological life, but not inversely.

Here Democritus' teachings imply a downright *theory of localization:*

The fire atoms themselves are everywhere the same. The various differences, therefore, do not depend on the fire atoms as such. The differences depend on where the fire atoms operate. When they act in the brain, there is thinking; when in the eye, then there is vision; when in the ear, one hears, etc. In the heart they are the condition for anger; in the liver, for greed; and so on. And when they are outside the organism, there is nothing but merely their capability of acting. This is, in rough lines, localization: Not what there is matters, but where it is, because the manner of action depends on the structure of the surroundings.

As a consequence, here definitely no aerial-ethereal structure is possible that could survive the organism. Such a structure must have been assumed by the Empedocles of the *Katharmoi*, by Heraclitus, obviously, and also by the Pythagoreans who, as will be shown, can hardly have realized that in any other way. With Democritus, however, and the Atomists in general for that matter, nothing of the kind is to be found any more. When the fire atoms are outside, nothing is left of any such structure. Hence, an individual psyche is then no longer possible.

It is this strict *rejection of individual pre- and postexistence* that matters, not the materialistic or pyrozoistic view as such. And it was for this very reason that the Christian writers, particularly Dionysius

the Great of Alexandria, were forthwith up in arms against Leucippus, Democritus, and Epicurus.

Consciousness is here just a function of the body. As it has been epitomized in Aetios:

> Leucippus and Democritus teach that the sensations and the thoughts are corporeal processes.
>
> Λεύκιππος, Δημόκριτος τὰς αἰσθήσεις καὶ τὰς νοήσεις ἑτεροιώσεις εἶναι τοῦ σώματος.
>
> *Aet. IV 8, 5; 67A30.*

Where Are the Atoms?

One of the main reasons why we deal with history of philosophy is that most of the problems are not yet settled, and that only by that study one comes to understand how the problems have arisen at all. For history of philosophy is more philosophy than history. It is the philosophies of the others – stations in a great overall process comprising the philosophical development within Western humanity, if not all mankind.

Knowledge of only the most recent philosophies or even, as in so many cases, one's own domestic system does not suffice. Of course, this, too, is some sort of history of philosophy, after all, but merely of some ten, fifteen years past or so and important exclusively to the respective little philosophy boss himself and his body-guard . . .

Because of those unsettled problems, it is unavoidable, or rather imperative, to discuss them, when they first appear, also from the viewpoint of systematic philosophy.

Right now, we are meeting such a problem.

Democritus assumes atoms that nobody has ever seen, in an empty space likewise not seen by anybody. Where is all that supposed to be?

For us today it is easy to answer: While color is in our worlds of appearance, the atoms and empty space are in the so-called external world. When in that external world a play of atoms occurs, then in each of our worlds a colored spot appears. For we assume a plurality of worlds: the external world opposite to all men and our internal worlds as its concomitant correspondences.

This, however, Democritus did not yet have. Nor did the other genuine Hellenes. There is no Greek term for "external world." A term such as ὁ ἔξω κόσμος (*ho exo kosmos*) has still to be discovered in Hellenic philosophical literature. Hence, there will have been no notion, either, of the metaphysical. The superscription, however, of

that Aristotelian writing, *Ton Meta Ta Physika* (Τῶν Μετὰ Τὰ Φυσικά) – a title given not by Aristotle himself anyway – is just to indicate the right sequence of study: "That which we should read after having read first the Physics" (τὰ μετὰ τὰ φυσικά, sc., πρὸς ἡμᾶς).[1] But the notion of another world is alien to the Greeks. And even the "world" of the Platonic Ideas is merely an invisible part of this one world, of this *kosmos monogenes*, just as the "world" of colors and the "world" of tones.

And now Democritus has to tackle the difficult problem of operating with the notion of an external world without having that notion.

Ninety-nine percent of all men do not have the philosophical notion of the external world even today, and in Democritus' day nobody had it. The notion of the world outside in the sense of "outside the skin of the body" – this notion even idiots have. But here is meant "outside my consciousness." Here an "external world" is meant as another world literally, a world "beyond." That would mean a world in which this room where I am sitting and writing would exist also after I go away, also when nobody else is here. And supposing there were present in my room ten persons, then this room would exist ten times, in ten worlds of appearance, and, in addition, once more in the external world. When something happens in that independent external world, something appears in these worlds of appearance.

Had Democritus already had these distinctions and notions, then it would have been easy for him to say: In the external world, there are atoms and an empty space, and in the internal world, or rather worlds, there are other spaces that have a continuous filling with color. But since he did not have these notions, words had to come to the rescue:

The atoms and the void are one complex of images, and continuous, colored filling is another complex of images, and these two complexes are kept apart by themselves. And because Democritus is not yet able to place the one of these complexes into an "external world," he is forced, if not to invent, but to adopt [2] the so-called reality degrees: The one complex is the real part of the world, and the other part, being more than nothing, after all, is "less real."

And ever since, we have been dragging along that famous gradation,

[1] This has been made plausible by A.-H. Chroust who has done away with the legend that that title was given, ostensibly by Andronicus of Rhodes, to denote an accidental "shelving order" of the Aristotelian writings. ("The Origin of 'Metaphysics'," in: *The Review of Metaphysics* [June 1961] pp. 601–616.)

[2] from Parmenides.

reale, realius, realissimum, that has no more meaning than "true, truer, truest" or "quadrangle, more quadrangle, most quadrangle." Only that in the case of the "degrees" of reality, due to certain gadgets of *camouflage*, the nonsense passes unnoticed. Smoothly flowing language, careful not to upset the melody of logic, contributes largely to this effect. If you say, for instance, "genuine reality" and "seeming reality" it would be exactly such an ingratiating haziness as required . .

Kinds, not Degrees, of Reality

The reality degrees, also called "degrees of being," had originally, in that period of the naive, ametaphysical monism of the Hellenes, the function of a stop-gap for the lack of a notion of the external world. This was a necessity of evolution, a transit-stage, and therefore, although a defect, not pathological as such. However, the reality degrees persisted when in late antiquity and the middle ages genuine metaphysics should have rendered that makeshift superfluous. And this retention of the obsolete beyond its time is indeed somewhat decadent, not to say pathological.

There are no reality degrees. There are various relations of dependence. A world of appearance is not "less real" than the external world. It is dependent on the external world. (In English, the ambiguity of the words "apparent" and "appearance," in German, the kinship of "scheinen" and "erscheinen" are contributing much to the confusion in this respect.) Similarly, the dream world is dependent on the world appearing in wakefulness. It is a reality dependent on the world of sensation in the stage of wakefulness. Yet, it is not in a lesser degree real, but merely dependent and, besides, of a very short duration. If you dream of a lot of money, then afterwards the money is not there any more, the dream reality does not last. But neither does what we perceive in wakefulness. It might last longer sometimes, but it is transient all the same, it does not last eternally. Yet, *during* the time of its presence it is real. It is not "less real" because it is perishable. It is only less reality: 10 is not less real than 100, it is only less. Even nonsense is a reality, a word reality, a verbal reality. There are merely different kinds of reality, differences in dependence of the kinds, and differences in duration. "There are no degrees, but merely kinds of reality. *Piano* is not less real than *forte*." [1]

But it is not only in times of old that all this was mistaken for a

[1] A. Stöhr, *Psychologie*, 2nd ed., Vienna, 1922, p. 384.

difference in the degree of reality, for a contrast of Seeming and Being. This has persisted, and not only until Herbart. It is haunting quite a number of philosophers even still today.

Here we have one more reason why that early period is of so paramount importance. For here we have not only the various types, here are also the basic problems for the first time, here are the fundamentals. Afterwards, everything is easy, for everything is then just synthesis, and the only really new additions later, in medieval philosophy, are those contributions stemming from the Biblical range of ideas.

The Disunion in Mind

Democritus, then, assumes degrees of reality, degrees of being. The atoms and the empty have the higher reality degree, the continuous filling with color, the lower reality degree. There is only one world – this oneness of the world is the implicit, tacit, and even not yet conscious presupposition – and in this one world there are just two different districts.

But now another question arises: Why do I see the colored filling of space and do not see the atoms in their empty space? What a strange sort of a "higher" reality that I cannot even see!

To get away from this difficulty, Democritus had to contrive two organs: an organ for the lower and an organ for the higher reality. The one is the eye (and all the other senses for that matter), the other, the brain. The lower reality is seen, the higher reality is thought.

For this disunion, he had to adopt the disunion in mind as taught by Parmenides and also Anaxagoras and transpose it into an atomistic and pyrozoistic key, although properly he would have been in a position to overcome this alleged disunion. And thus the lack of the idea of a division of the universe into worlds of appearance and world beyond has forced Democritus not only into that gradation of reality, but also made him accept a splitting of perceptive faculty into a faculty of seeing and a faculty of thinking, or, translated into materialistic language, into eye and brain.

Today, of course, one could say: I cannot have an image of the external world, though, I cannot peep into the metaphysical, for I do not have any organ, not even an organ of thinking, for that. But I can have, I can make up, symbols for it. The eye sees, but the eye also provides me with plastic imaginations, and out of these I can build up symbols for the inaccessible. Symbol, namely, is different from copy.

The picture of a horse is a copy. But the word "horse" is not a copy of a horse. It is a symbol.

In Democritus, there is nothing of the kind.

'Eteé' and 'Nomo'

Democritus, and the Atomists in general, had technical terms for the higher and lower reality degrees. That is, after all, the way with philosophers to have their own terminologies. The higher, or genuine, reality is called *eteé* (ἐτεῇ), the lower reality, the reality of seeming, the lesser reality that can be seen, they call *nomo* (νόμῳ).

In Galen, Democritus is quoted as saying:

> *Nomo*, namely, (is called) color, *nomo* the bitter, *nomo* the sweet, *eteé*, however, (are called only) the atoms and the empty (space).
>
> νόμῳ γὰρ χροιή, νόμῳ πικρόν, νόμῳ γλυκύ, ἐτεῇ δ' ἄτομοι [1] καὶ κενόν.
>
> *Galen. de elem. sec. Hipp. I 2; A49.*

These terms are very short and lapidary indeed and need some explanation. That they are terms coined by Democritus is expressly stated by Galen who says that the nature of things Democritus

> calls *eteé*, forming this word with a view to *eteón* which means "true."
>
> . . . ὅπερ . . . 'ἐτεῇ' καλεῖ παρὰ τὸ 'ἐτεόν,' ὅπερ ἀληθὲς δηλοῖ, ποιήσας τοὔνομα. *l.c.*

Nomo means "by convention," that is: "What by convention is called genuinely real and in fact is not genuinely real." And *eteé*, or "genuinely," means: "The genuinely real that, however, is not so called by convention." That is to say in this case: "By convention, color, the bitter, the sweet are called genuinely real, while being only seemingly real. Genuinely real are only the atoms and the empty space."

And then Democritus has to formulate also that alleged split of the faculty of cognition into two organs, his answer to the question of why

[1] In the whole, long passage containing this quotation, Galen always correctly uses the Democritean term ἡ ἄτομος (feminine) for "atom." It seems, therefore, obvious that also in the quotation ἄτομοι is the correct form. One of the manuscripts has ἄτομον, the others ἄτομα. Both (un-Democritean) versions are easily accounted for. The ending -οι could have inadvertently been changed by a copyist into -ον, and then other copyists replaced the singular by the plural ἄτομα.

the eye sees the one reality and does not see the other. The eye is just the organ for the lower reality and cannot see the higher, and the brain cannot see the higher reality, either, but can think it.

A plastic illustration of this Democritean idea is given in that famous sentence that, however, usually is interpreted quite differently. In Greek, it reads:

> ἐτεῇ δὲ οὐδὲν ἴδμεν· ἐν βυθῷ γὰρ ἡ ἀλήθεια.
>
> *fr. 117 (Diog. Laert. IX 72).*

This is commonly translated as: "In fact we know nothing, for the truth lies in the depth." (Miss Freeman translates even: "for truth lies in an abyss.") And ever since the day of the ancient Sceptics, this sentence has been taken for an evidence that basically Democritus was a radical sceptic, contending that "in fact we know nothing."

To get at the meaning of the words of a real philosopher, one has to learn not only how to read slowly (very slowly!), but also how to read with the right accentuation.

Here one could accentuate: In fact, we know *nothing*. But one could as well accentuate *eteé* and, remembering that this is a technical term, translate and accentuate: *Conerning the genuinely real*, we know nothing. And this makes all the difference. *Eteé* being a special term with Democritus, one cannot, all of a sudden forgetting about it, just simply translate it as "in truth" or "in fact" or so. Something can certainly be bitter "in fact," but not *eteé*. The meaning, therefore, is here: We know nothing about the genuinely real, the higher reality degree.

But this is not all. In Greek it says: οὐδὲν ἴδμεν (*ouden idmen*). This has been translated as "we know nothing," and it is one of those ironical enigmas how it could escape the notice of all those famous philologists that this translation is wrong. For *idmen* (ἴδμεν) is the aorist to *horan* (ὁρᾶν), "to see," and means "we have seen." "We know" is in Greek not *idmen*, but *ismen* (ἴσμεν), the plural of *oida* (οἶδα), "I know."

True, etymologically *idmen* ("we have seen") and *ismen* ("we know") have the same root *vid* (as in Latin *video*). At any rate, therefore, if *idmen* shall stand for "we know," then only in the sense of "we have seen," in other words, in the sense of *knowledge from experience* – as contrasted to *knowledge by inference*.

Hence, the meaning and the correct accentuation of that sentence is: *Eteé* de ouden *idmen, about the genuinely real* nothing is to us *known*

from experience. Here we have inferences, but no empirical knowledge. We have, consequently, two faculties of cognition: the one perceives the *nomo*-reality, and the other infers therefrom.

And why is this so? – "Because the truth is *en bythó* (ἐν βυθῷ)" which means "on the ground, on the bottom of the sea." What we see, is the water, the lesser reality, and what we see not, is the bottom of the ocean. Between us and the genuine reality lies the lower reality.

> And in the sense of this distinction, it should be clear to man that he is being kept from (any perception of) the genuinely real.
>
> γινώσκειν τε χρὴ ἄνθρωπον τῷδε τῷ κανόνι, ὅτι ἐτεῆς ἀπήλλακται.
>
> *fr. 6 (Sext. Emp. adv. math. VII 137).*

Although, therefore, the brain can find out by way of conclusion,

> it will still be obvious that concerning the genuinely real it is impossible to perceive how everything is.
>
> καίτοι δῆλον ἔσται, ὅτι ἐτεῇ οἷον ἕκαστον γιγνώσκειν ἐν ἀπόρῳ ἐστί.
>
> *fr. 8 (Sextus l.c.).*

For what of the genuinely real is it, after all, that one could wish to make sure and see by direct perception? Apart from size and velocity, it is the variety of the atomic shapes, the differences in *rhysmos*, the *diaphérontes rhysmoi* (cf. fr. 5i), that constitute the ultimate differences between the atoms, their material being the same for all of them. And just these differences of the true, unchangeable shapes of the atoms are beyond the reach of our ability of direct perception. For, to quote Alexander again, "on account of the smallness of the particles, the senses are not able to perceive any of them alone" (cf. p. 419).

It may be that these shapes could be seen by animals the size of ants, or still smaller living beings, with correspondingly smaller sense organs.

> We (humans), however, perceive nothing reliably concerning the true (sc., the true shape of the genuinely real), but (merely) the variable (shape) (that comes about) by way of the (variable) concatenation [1] of an aggregate (literally: of a body): (the concatenation) of those (atoms) which additionally join (the aggregate) as well as of those sticking together (sc., as the original core of the aggregate). (cf. p. 419f.).
>
> ἡμεῖς δὲ τῷ μὲν ἐόντι οὐδὲν ἀτρεκὲς συνίεμεν, μεταπῖπτον δὲ κατά τε σώματος διαθιγὴν [1] καὶ τῶν ἐπεισιόντων καὶ τῶν ἀντιστηριζόντων.
>
> *fr. 9 (Sext. Emp. adv. math. VII 135).*

[1] In the Diels-Kranz text it says διαθήκην. The version διαθιγὴν is brushed aside by Kranz with a laconic "*falsch.*" Experience has taught me to take this as a rather reliable warning that the rejected version is worthwhile pondering and may even be the solution of a problem. Needless to say that the specific term διαθιγή is here the only expression to make good Democritean sense.

And this virtually flickering shape of an aggregate, being merely the transient effect of a flexible *epirhysmíe* (ἐπιρυσμίη), the resultant of a summation of the *rhysmoi* of the atoms of the aggregate, does of course not yield any empirical knowledge of the genuinely real, but merely of a seeming reality, or *doxis* (δόξις).

> Hence, then, indeed also this reasoning shows that about the genuine reality we know nothing by experience, that, however, the seeming reality is for everybody (merely the result of) a summation of (atomic) shapes.
>
> δηλοῖ μὲν δὴ καὶ οὗτος ὁ λόγος, ὅτι ἐτεῇ οὐδὲν ἴδμεν [2] [περὶ οὐδενός],[2] ἀλλ' ἐπιρυσμίη ἑκάστοισιν ἡ δόξις.[3]
>
> *fr. 7. (Sext. Emp. adv. math. VII 137)*

'Gnesíe' and 'Skotíe'

There is, then, a split of cognition, of *gnosis*, or, as Democritus says, *gnome*, into cognition by experience and cognition by inference. Cognition by experience corresponds to the *nomo*-reality, cognition by inference, to the *eteé*-reality.

The remark made above that this disunion in mind was adopted by the Atomists from Parmenides has now to be somewhat qualified, as follows from this passage in Sextus:

> In the Book of Rules he (sc., Democritus) teaches that there are two cognitions: the one by the senses, the other by thinking. Of these, he calls the cognition by thinking "genuine" (*gnesíe*), thus attesting to its reliability as to ascertainment of the truth. The

[1] See note page 430.

[2] In the Sextus text as handed down it says ἴσμεν. Sextus Empiricus, the sceptic, eager to find among the venerable wise men of old, the *palaioi*, witnesses corroborating his own scepticism, has no real understanding of Democritus' idea. ("Er *versteht* nicht," says H. Langerbeck correctly of Sextus [*l.c.*, p. 7].) Therefore, he promptly turns the original ἴδμεν into ἴσμεν and, for good measure, even adds a περὶ οὐδενός. Then, naturally, the whole sentence is a wonderful testimony in favor of a radical scepticism: "In fact we know nothing about anything.."

[3] Δόξις (*doxis*), the same as δόκησις (*dokesis*), means "appearance," "seeming."

cognition through the senses, however, he calls "obscure" (*skotíe*), depriving it of the infallibility concerning the cognition of the true. He says literally:

> Of cognition, however, there are two forms, the one genuine, the other obscure: and to the obscure one belong all these together: vision, audition, smell, taste, touch. From this, however, the genuine one is separated.

Then, preferring the genuine (cognition) to the obscure one, he continues:

> Whenever the obscure (cognition) is not able any more to see, as far as something smaller is concerned, or to hear or smell or taste or feel by touch, as far as something finer is concerned, then the genuine (cognition) supervenes.[1]

ἐν δὲ τοῖς Κανόσι δύο φησὶν εἶναι γνώσεις· τὴν μὲν διὰ τῶν αἰσθήσεων τὴν δὲ διὰ τῆς διανοίας, ὧν τὴν μὲν διὰ τῆς διανοίας γνησίην καλεῖ προσμαρτυρῶν αὐτῇ τὸ πιστὸν εἰς ἀληθείας κρίσιν, τὴν δὲ διὰ τῶν αἰσθήσεων σκοτίην ὀνομάζει ἀφαιρούμενος αὐτῆς τὸ πρὸς διάγνωσιν τοῦ ἀληθοῦς ἀπλανές. λέγει δὲ κατὰ λέξιν·

> γνώμης δὲ δύο εἰσὶν ἰδέαι, ἡ μὲν γνησίη, ἡ δὲ σκοτίη· καὶ σκοτίης μὲν τάδε σύμπαντα, ὄψις, ἀκοή, ὀδμή, γεῦσις, ψαῦσις· ἡ δὲ γνησίη ἀποκεκριμένη δὲ ταύτης.

εἶτα προκρίνων τῆς σκοτίης τὴν γνησίην ἐπιφέρει λέγων·

> ὅταν ἡ σκοτίη μηκέτι δύνηται μήτε ὁρῆν ἐπ' ἔλαττον μήτε ἀκούειν μήτε ὀδμᾶσθαι μήτε γεύεσθαι μήτε ἐν τῇ ψαύσει αἰσθάνεσθαι ἐπὶ λεπτότερον, <τότε ἐπιγίνεται ἡ γνησίη.> [1]

fr. 11 (Sext. adv. math. VII 138).

That is to say, *the intellect continues where the senses begin to fail us.* It is exactly as with the water and the bottom of the sea.

This, however, shows that the disunion in mind as taught by Democritus is not a flat adoption of the Parmenidean position. With Parmenides, as will be seen, the rift is unbridged. Thinking is meant as abstract, discoursive thinking and as entirely different from sense

[1] In the Diels and Kranz editions, the ending part reads:

> . . . αἰσθάνεσθαι, ἀλλ' ἐπὶ λεπτότερον <δέῃ ζητεῖν, τότε ἐπιγίνεται ἡ γνησίη ἅτε ὄργανον ἔχουσα τοῦ νῶσαι λεπτότερον>.

The ἀλλ' of the text has been deleted by Brieger ("Demokrits angebliche Leugnung der Sinneswahrnehmung," *Hermes* 37 [1902] 56–83). I adopt this suggestion. – The whole part in brackets is a conjecture made up by Diels. It seems to me that the shorter completion as suggested above would be sufficient and clearer.

perception. This is not so with Democritus. For here thinking is concerned with just another set of possible sense perceptions, strictly speaking. That is also why in ancient sources time and again it is emphasized that Democritus, just as Empedocles, declares sense perception and thinking to be identical basically since both, after all, are functions of the same fire atoms.

> Democritus . . . who says that thinking and sense perception are the same, and that they proceed from one faculty.
>
> Δημόκριτος . . . ταὐτὸν εἶναι λέγων τὸ νοεῖν τῷ αἰσθάνεσθαι καὶ ἀπὸ μιᾶς ταῦτα προέρχεσθαι δυνάμεως.
>
> *Philoponus de anima 35, 12 (A 105); cf. also Arist. de anima I 2. 404a27 and 405a5 (A101) and Philop. de anima 71, 19 (A 113).*

No Metaphysical Construction

The realm of the intellect is to Democritus the ultramicroscopical, as it were. His construction, therefore, is meant as a substructure within this world, not as something that co-exists in another world.

If it were a truly metaphysical construction, the atoms without ado could be as big as bricks or cannon balls. But to Democritus they are in this world, and it is only on account of their smallness that our eyes cannot see them. Were they big enough, they would be seen. Whereas today, we should have to say they would not be seen though they may be ever so big because they are in another world, and what we see is merely concomitant to them.

In Democritus' opinion, however, the atoms are in this world, and only the brain can think them. The eye does not suffice any more, but the brain goes on working – just as one says one does not see a thing any more, but still can hear it.

With this it is not incompatible that Democritus might have declared there could be also some atoms of gigantic size. Such giant-atoms would be the kernels of celestial bodies and as such likewise invisible: on account, namely, of their being covered from all sides by those other parts "circumplaiting" the kernel. And while the tiny atoms could be seen if they were larger, these nuclei of celestial bodies would become visible if it were possible to pierce open the shell around them. For both kinds, the infinitely small atoms and the gigantic ones, are meant by Democritus as located in that same, one world of the naive, ametaphysical monism of the Hellenes . . .

Theory of Vision

Intellect, then, is a function of the fire atoms in the brain, sensation the function of the fire atoms in the eye and the sense organs in general. In the eye, they have the structure of the eye, in the brain, the structure of the brain, because, while inside an organism, they are always each embedded between two atoms of the immediate surrounding. And when the fire atoms get outside the organism, those structures are gone. Therefore, as already pointed out, there is no ethereal-aerial structure possible that could survive the death of the organism.

But there is no room either for any "subject of thinking" and "subject of sensation." With Democritus, there is no pre-existence, no post-existence, no subject of thinking, no subject of feeling. There is just merely feeling itself and thinking itself.

Keeping this in mind, one easily understands Democritus' theory of perception, particularly his theory of vision.

Already Empedocles, as has been demonstrated, had advanced a theory of vision. According to him, seeing comes about through effluences from the objects toward the eye and effluences from the eye toward the objects. When these effluences meet outside the body, somewhere between the eye and the object, this stroke of contact is conducted back into the eye by those invisibly fine ethereal and aqueous rods, and the effect is vision and reaction upon what is seen, respectively. If this is translated into atomistics, the result is Democritus' theory.

With Democritus, effluences from the eye are not possible. When getting outside, the fire atoms would dissipate. Hence, they can only fly to the eye as a reflection from the objects. As Aetios says:

> Leucippus, Democritus, and Epicurus think that vision occurs by way of a secretion toward (sc., the eye) of little pictures.
>
> Λεύκιππος, Δημόκριτος, Ἐπίκουρος κατὰ εἰδώλων εἴσκρισιν οἴονται τὸ ὁρατικὸν συμβαίνειν πάθος.
>
> *Aet. IV 13, 1; 67A29.*

Thus, here too seeing is reduced to touching:

> Democritus and most of all those physiologists speaking about sensation behave quite silly: for they make all sensations possible into objects of touching. Yet, if this be so, then it would imply that also any of the other sensations is some sort of touch.

> Δημόκριτος δὲ καὶ οἱ πλεῖστοι τῶν φυσιολόγων, ὅσοι λέγουσι περὶ αἰσθήσεως, ἀτοπώτατόν τι ποιοῦσιν· πάντα γὰρ τὰ αἰσθητὰ ἁπτὰ ποιοῦσιν. καίτοι εἰ οὕτω τοῦτ' ἔχει, δῆλον ὡς καὶ τῶν ἄλλων αἰσθήσεων ἑκάστη ἁφή τίς ἐστιν.
>
> *Arist. de sensu 4. 442a29; A119.*

Only that with Empedocles seeing is an active touching by effluences emitted from the eye, while with Democritus vision consists in being touched, being bombarded, by reflected atoms. It depends on *eiskrisis* (εἴσκρισις), or secretion toward the body, of atoms rebounding from the objects and thus forming a "little image," an *eidolon* (εἴδωλον).

The fire atoms – the light-ether atoms, as we should say – flying to an object from all sides are thrown back from its surface, and by that a mask, as it were, peels off from the object. Take, *e.g.*, a square. All atoms bounding against the square at the same time will also rebound in the form of a square. Even though they may not fill it up, they will still be all in a square plane.

When the eye is hit by such an *eidolon*, there is vision:

> Democritus, namely, says that seeing consists in receiving the reflection coming from the seen objects. By reflection, however, is meant that picture which appears on the pupil, but similarly also on all the other transparent objects which are able to keep on themselves the reflection. He believes, just as Leucippus before him and later on the followers of Epicurus, that something like little pictures flowing from, and of like shape with, the objects from which they flow (these, however, are the visible things) get into the eyes of those who see, and that in this way seeing comes about.
>
> λέγει γὰρ Δημόκριτος τὸ ὁρᾶν εἶναι τὸ τὴν ἔμφασιν τὴν ἀπὸ τῶν ὁρωμένων δέχεσθαι· ἔστι δὲ ἔμφασις τὸ ἐμφαινόμενον εἶδος ἐν τῇ κόρῃ, ὁμοίως δὲ καὶ ἐν τοῖς ἄλλοις τῶν διαφανῶν, ὅσα οἷά τε τὴν ἔμφασιν φυλάττειν ἐν αὑτοῖς. ἡγεῖται δὲ αὐτός τε καὶ πρὸ αὐτοῦ Λεύκιππος καὶ ὕστερον δὲ οἱ περὶ τὸν Ἐπίκουρον εἴδωλά τινα ἀπορρέοντα ὁμοιόμορφα τοῖς ἀφ' ὧν ἀπορρεῖ (ταῦτα δέ ἐστι τὰ ὁρατά) ἐμπίπτειν τοῖς τῶν ὁρώντων ὀφθαλμοῖς καὶ οὕτως τὸ ὁρᾶν γίνεσθαι.
>
> *Alexander de sensu 24, 14; 67A29.*

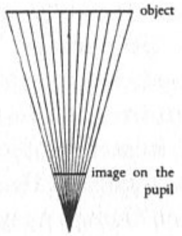
(It would be, of course, a crude anachronism to take those little pictures for images on the retina. What Democritus means is merely the image – which anybody can see when looking into the eye of

another person – on the anterior side of the lense or perhaps even only on the anterior part of the cornea.)

What in this conception is implied is the following:

In the *eidolon*, the fire atoms do not remain the way they are when rebounding from the object. They move ever closer each other, and thus the *eidolon* becomes ever smaller and smaller until finally it can enter the eye and appear in the *kore* (κόρη), the pupil.

This rather naive view can be visualized as follows:



This is how the atoms converge. The picture becomes ever smaller, but there is no image conversion, no turning upside down, and correctly so, since the picture is still before the point of junction. Hence, there is only diminution, but no inversion.

That is to say, one sees neither the object as it is nor the *kore* as it is, but in the *kore* the object. In other words, one sees the object so as the *kore* is – as continuously filled with color, and not as a radiating, colorless object built of atoms –, but, on the other hand, in the object's own size and at its own place!

Yet, it would not be fair to blame Democritus for this hypothesis of "externalization," or "projection." For its modern counterpart is still almost identical with the ancient original. The difference consists only in trifles. Today, the *kore* picture is replaced by the retina picture. Accordingly, while in antiquity some mysterious agent had to do the permanent job of shoving the tiny *kore* picture back outside divergently until it reached the place, and regained the size, of the seen object, now that same mysterious agent has also the little additional job of turning the upside-down retina picture around on the way back somewhere between the eye and the "object." But in the modern hypothesis the nonsense is perfectly the same, the ostensible problem is just as idiotic, and the philosophical problem proper is not a bit even touched by that.

The problem proper cannot be solved without a clear distinction between our phenomenal body and our metaphysical body, the

phenomenal eye and the metaphysical eye, and the phenomenal retina, accordingly, and the metaphysical retina, and the phenomenal, or rather ophthalmological retina picture and the metaphysical retina picture. *My phenomenal body is then the direct and immediate correspondence to the self-copy, the self-portrait, of my metaphysical body on its metaphysical retina.* This metaphysical retina has the size of the phenomenal celestial vault, and the rest of my metaphysical body, or metasoma, is correspondingly gigantic. The whole pseudo-problem of the projection hypotheses, modern and ancient, comes from the naiveté of expecting the phenomenal body to correspond to the metaphysical body instead of to the metaphysical retina picture of the metaphysical body.

Accordingly, the whole world of appearance, all things as they appear to me, have the size and place of their pictures on that gigantic metaphysical retina. In other words, the places of the things appearing to us are in the metaphysical retina, and there is no need whatsoever for any "externalization" or "projection" or enlargement.

(To be strict, the place of a phenomenal thing is not exactly the place of the metaphysical retina picture. Since our metaphysical body has two metaphysical eyes, the place of the appearing thing is the geometrical centre between the two metaphysical places of the two pictures.)

(As to the inversion of the retina picture, it is very probable that in fact we do see all things "inverted" and just get used to it. Experiments have been made with eyeglasses that produce inverted pictures, and the result has been that indeed one gets used to this, too.)

The very first to understand the problem and also to give the right answer was the great physiologist Johannes Peter Müller (1801–1858), the famous initiator of the doctrine of the specific qualities of sensation.[1] He has made it clear that the retina picture is in the external world, and that the things appearing to us correspond to the retina picture immediately, without any "projection" or "externalization." To simplify the presentation of his ingenious hypothesis, he reduced the two eyes to one fictional "cyclopic" eye in the middle. Johannes Müller was the first to really philosophize about this matter.[2] Apart from him, also Friedrich Ueberweg (1826–1871) understood the problem correctly, and then, finally, Adolf Stöhr (1855–1921).

[1] *Zur vergleichenden Physiologie des Gesichtssinnes.* Leipzig, 1826.
[2] A popular presentation of his ideas is given also in Otto Liebmann's, *Zur Analysis der Wirklichkeit.* Strassburg, 1876; 4th ed., 1911.

Two Accessory Questions

It is conspicuous that, to all appearances, Democritus never put to himself the question: Having two eyes, why do we see simple? This is an impressive instance of that frequent phenomenon of problem blindness. This fact, incidentally, makes it also doubtful that Empedocles should have felt that question, as it seemed to us possible when mentioning his short fragment 88 (cf. p. 377). Had Empedocles even merely raised the question, it would have been taken up and elaborated by Democritus.

There is still another remarkable point in his theory of vision.

Why do those atoms of the *eidolon* converge on their way toward the eye? They could no doubt rebound as well parallel or in divergent directions. Why precisely in that specific manner? They do not desire – do they? – to make sure that the *eidolon* will get sufficiently small to enter the eye. There is no answer in any of the fragments or reports handed down.

However, it is rather easy and, in due reverence for a thinker of Democritus' rank, also justified to fill up the gap:

In all probability, Democritus did have the conception that the fire atoms flew back in all directions possible, partly divergent, partly parallel, partly convergent, and also in all possible degrees of convergence and divergence, but that we just see only those rebounding in such great convergence as to form an *eidolon* tiny enough for the *kore*, while all the rest of that complete system of reflections cannot be perceived.

No "Subject" of Consciousness

Democritus' theory of vision is a proof of the contention that the notion of a subject of perception or of thinking was alien to him. He did not yet have that notion.

When the fire atoms in the eye are touched by the *eidolon* on the *kore*, the object is seen, and not such as it is, but as the *kore* appears, yet in the size and at the place of the radiating object. The object as seen is now called *nomo chroié*, whereas the radiating, colorless object built of atoms exists *eteé*. And what about a "subject" of sensation and thinking?

Are now the colored objects the "contents" of sensation for the "subject" insofar as it is the perceiver, while the atom systems are transcendent "things for themselves," and is there, besides, the atom hypothesis as a "contents" of thinking for that same "subject" insofar as it is the thinker?

Not at all. In the stead of a subject of sensation and thinking, we find here merely the fire atoms in the eye and the brain, properly. Here, with Democritus, things are seen *by* the eye, not by means of the eye.

Democritus had two ways before him, and both were for him still too difficult (just as they had been for Empedocles):

He could have let dwell in the eye and the brain a subject of sensation and thinking that together with the atoms and the sense-given colored bodies is in one and the same world. Or else he could have contrasted to the play of atoms a separate world of appearance containing the subject with the sense-given objects, colored, sounding, sweet, bitter, warm, cold, etc., and also with the atom hypothesis, while the atoms themselves would remain in a primordial, external world to which would belong also the brain itself and the play of the atoms of the brain. And in this case, he would have had to assume also two kinds of *eidola:* metaphysical *eidola* remaining in the external world and phenomenal *eidola* that we see in the eye of another person and, as far as we ourselves are concerned, only in the mirror.

Democritus, however, not yet having the notion of an external world, has assumed, of course, only one kind of *eidola*. And since he has not yet the notion of a consciousness subject either, the eye is to him merely the image-catcher, strictly speaking, just as to Empedocles it is the image-toucher, and not an image-seer.

Yet, on the other hand, it is perfectly self-evident that neither Leucippus nor Democritus believed, or meant to say, that seeing was nothing more than just this purely physical catching of the *eidola*. They will certainly not have assumed that a water surface where the sun is reflected *sees* the sun, or that the sea, the rivers, and brooks have no vision merely because the quantity of the fire atoms they contain is just too small.[1]

As a matter of fact, the fire atoms in the eye and the brain are here actually treated in a way as if they themselves were the subject of sensation and thinking, while at the same time they still remain under the notion of image-catcher. The notion of a catching apparatus for *eidola* is used now as itself for itself, now, instinctively, as a vicarious precursory notion substituting for the as yet lacking notion of the subject of sensation and thinking.

[1] Only a philologist has been able to suspect something like that. ("... und vielleicht hätte er [sc., Democritus] durchaus zugegeben, dass etwa der Spiegel 'ὁρᾷ'." H. Langerbeck, *l.c.*, p. 95.)

One may be allowed to assume here such relatively illogical stage of the human mind all the more as even today there are still quite a few people, and even scientists, who, not grasping the difference between the phenomenal and the metaphysical retina pictures, would consider it a monstrosity to equate the size of a phenomenal thing and the size of its metaphysical retina picture.

That Democritus actually operates, so to speak, with something like a subject without having that notion can be gathered from a passage in Theophrastus. Democritus must have been alive to the fact that there is a difference between a sensation and the reaction upon it, that both belong together as two parts of one occurrence, and that, while the sensation as such comes about in the respective sense organ, the reaction is performed through various parts of the whole body. Accordingly, to make reaction possible, the stimulus, as we should say, must not exhaust itself in the sense organ nor be kept from dissipating through the rest of the organism. That is why the eye, says Democritus, must have "emptiness" – meaning empty interstices, pores – where the fire atoms coming from outside can penetrate into the interior, and "moisture," obviously as the vehicle for their communication inside the body. Consequently, the stimulus must be strong enough, and not meager, since otherwise it would not get beyond the sense organ itself. And there is indeed virtually no reaction whenever a sensation is too weak.

This whole train of Democritean thought has not been understood by Theophrastus who promptly calls it nonsensical:

> Nonsensical, however, is it also to give not only the eyes, but also the rest of the body a share in the sensation. He (sc., Democritus) says, namely, that this is why the eye must contain emptiness and moisture: to (be able to) receive still more (sc., of the fire atoms) and convey it to the rest of the body.
>
> ἄτοπον δὲ καὶ τὸ μὴ μόνον τοῖς ὄμμασιν, ἀλλὰ καὶ τῷ ἄλλῳ σώματι μεταδιδόναι τῆς αἰσθήσεως. φησὶ γὰρ διὰ τοῦτο κενότητα καὶ ὑγρότητα ἔχειν δεῖν τὸν ὀφθαλμόν, ἵν' ἐπὶ πλέον δέχηται καὶ τῷ ἄλλῳ σώματι παραδιδῷ.
>
> *Theophr. de sensu 54; A 135.*

Who "receives"? Who "conveys"? – "The eye," is what Democritus says. "The subject" is what in fact he means unwittingly.

Incidentally, just as the notions of purely physical activities, such as catching or touching, are here forerunners of the notion of a "subject" of seeing and thinking, so this notion of a "subject" is itself likewise a vicarious, precursory notion, strictly speaking. Georg Christoph Lichtenberg (1742–1799) came to understand – and after him a few more – that that division into subject and object is merely metaphorical and a forerunner of the notion of an undivided world of appearance. Language, he has pointed out, forces us to speak of that undivided world in such a way as if in it a "subject" were contraposed to a consciousness-"contents," appearing to the "subject" as an "object," and even also as if there were a "physical phenomenon" of color and a "psychical act" of seeing it, performed by that "subject" . . .

'Oh You Pitiable Intellect . . .!'

The rest of what has survived of Democritus' psychophysiology (buried, in the main, under the surface of the none too understanding reports, and the rather haughty criticism, by Theophrastus), though highly interesting in its details, does not seem to have further philosophical significance beyond what has been discussed in the foregoing.

As has been shown, Democritus not yet having the notion of an external world was forced to resort to reality degrees, in order to find accommodation in one world for the sense-given colored things and the colorless atoms. In accordance with his postulation of a higher and a lower degree of reality, an *eteé*-reality and a *nomo*-reality, he had also to assume two sorts of cognition, the genuine sort through the thinking brain for the *eteé*-reality and the obscure sort through the perceiving senses for the *nomo*-reality.

However, what the brain "cognizes" by thinking, by inference, is merely another set of possible sense-data since, according to Democritus, the brain only continues after the senses stop working. Cognition through thinking, therefore, turns out to be not truly different in kind from cognition through the senses, the transition from perceiving to thinking not being a *metabasis eis allo genos*, because to Democritus the working of the brain, the intellect, does not mean any "abstract," "discoursive" thinking.

It implies certainly no contradiction that the same thing which by the eye is seen as color is heard by the ear as tone and felt by the skin as hard. But there is indeed a contradiction between what is seen by the eye and what is allegedly cognized by the brain. For colored and continuous filling of space and colorless atoms in an empty space do

contradict each other (if the same space is meant which in fact is the case with Democritus).

That is why Democritus had to discriminate between the two sorts of cognition, giving the one the rank of genuineness, while calling the other "obscure." But – which is which by rights?

The intellect, inferring the "genuinely real," needs of course premises to its conclusions. These premises, however, are nothing else but what the senses offer, nothing but the "lower" reality that is between the "genuine" reality and the brain just as the water of the sea is between the bottom of the sea and us. Why, then, should the testimony of the brain pass for "genuine" and the testimony of the senses for "obscure"? Why not rather the other way round? May be the senses are still inadequate, for other reasons. But their testimony, nevertheless, should at any rate be less false than that of the brain, one would expect.

This is a difficulty that cannot be overcome. And Democritus did not overcome it. However, he felt it in the end:

> After having cast suspicion on the sense perceptions by saying: "Real by convention (only) are color, the sweet, the bitter, but genuinely real are the atoms and the empty," Democritus has made the senses retort upon the intellect in this way: "Oh you pitiable intellect! After taking from us all your evidences you reject us? This rejection is your own undoing!"
>
> Δημόκριτος . . . ὁπότε τὰ φαινόμενα διέβαλε, 'νόμῳ χροιή, νόμῳ γλυκύ, νόμῳ πικρόν,' εἰπών, 'ἐτεῇ δ' ἄτομοι καὶ κενόν,' ἐποίησε τὰς αἰσθήσεις λεγούσας πρὸς τὴν διάνοιαν οὕτως· 'τάλαινα φρήν, παρ' ἡμέων λαβοῦσα τὰς πίστεις ἡμέας καταβάλλεις; πτῶμά σοι τὸ κατάβλημα.'
>
> *fr. 125 (Galen. de medic. empir. fr. 1259, 8).*

Having arrived at this point, why did Democritus not draw the consequence and recant? Why did he not just cancel his whole ingenious construction?

He could not have an inkling of what only most recently has dawned upon a few: that philosophical constructions are not cognitions, but pieces of art, differing from other works of art only by that concomitant belief arising when a work of philosophical artistry seems to be well done.

Democritus could not know that. But in fact he was an artist in spite of himself, and not only in the sense of being a master of presentation, a writer of high skill, but also otherwise. "Divine it is for a mind to fancy

to oneself all the time something nice." [1] This is the attitude of an artist. It is the same attitude as that revealed in Democritus' confession that he would prefer solving one problem to becoming the Grand King of Persia.[2]

Democritus' atomistic construction was indeed "something nice." He just could not prevail upon himself to give it up, in spite of the logical flaws he found out in the end himself. Something like a resigned belief may have been the final outcome. He could not help it. As we have pointed out when characterizing the theorogon type of philosophy (cf. p. XXIX): "Such belief cannot be forced by any logical operations. But neither can logical operations suppress it."

DEMOCRITUS AND POSTERITY

The impact of Democritus and his teachings has been great and lasting and is felt still today. The vicissitudinous history of the doctrine is quite a story.

The Reactions of Plato and Aristotle

Considering that any "soul" that could survive the body and any purposeful arrangement of the world occurrence, as the "work of art" of any god, are strictly rejected by Democritus, one could very well understand that Plato may have been shocked at such a doctrine.

When Democritus died in 404 B.C., Plato was still rather young. Seeing how the brilliant writings of the Abderite were avidly devoured by the reading public, Plato in youthful impetuosity may indeed have felt the mad urge to buy up and burn all the copies he would be able to collect of books by Democritus, as it has been related, according to Diogenes Laertius (IX 40), by Aristoxenos. The same source has it that Plato was finally kept from doing so by the Pythagoreans Amyklas and Kleinias who made him realize that it would be of no avail any more since too many people already possessed those books.

Philologists, and in general all those to whom Plato means "the divine Plato," do not like that story. They say this is a malicious fabrication made up by "the ancient tradition" that "turned everything completely into its contrast." [3] And when in Archer Hind's *Timaeus* commentary, in 1888, and subsequently by some other

[1] Θείου νοῦ τὸ ἀεί τι διαλογίζεσθαι καλόν. (fr. 112)
[2] Cf. fr. 118.
[3] v. Wilamowitz-Moellendorff, *Platon*, I, 2nd ed., Berlin, 1920, p. 588.

scholars it was demonstrated that, mainly in the *Timaeus* but also otherwise, Plato adopted quite a lot from Democritus, it was felt as a great satisfaction: "It is beautiful and a relief that now we know with what susceptibility he (sc., Plato) received and in himself elaborated the stimulation by the great natural scientist." [1]

However, with such unctuous phrases we cannot get rid of the real problem.

There are here three hard facts. First, there is that report by Aristoxenos. To brush things aside just because they would not fit into certain prejudices is a frequently practiced, but nevertheless objectionable method. But supposing even one could discard that report, the second fact is not removable, the fact, namely, that Plato indeed in many places, not only in the *Timaeus*, has borrowed from Democritus.[2] Finally, however, there is a third fact, and a fact hard as a rock: Nowhere in Plato is Democritus' name ever mentioned! Why? (And why does v. Wilamowitz not mention this embarrassing fact?)

"The whole question needs a new treatment," as Dr. Kranz correctly observes.

When Plato felt tempted to exterminate the books of Democritus – there is no legitimate reason for doubting that report – he must have been young and Democritus must have been already dead. For otherwise the mere idea would have been absurd, and Plato ought to have had the intention to kill Democritus himself.

In the course of his long life, however, Plato may have come to know better. He will have learned, in spite of himself, to appreciate and even adopt many of the ingenious accomplishments of Democritus. But after having had, although in days long passed, the professed intention to burn the books of the man, could he ever mention that hated name? Certainly not. That, however, his hatred remained unabated throughout his life is proven by those same lines in the *Laws* (889B) mentioned already in the presentation of Empedocles' doctrine. For Plato's vehement attack against those spreading "the disease" of disbelief in

1 *ibidem*, p. 587 (".. es ist schön und befreiend, dass wir jetzt wissen, mit welcher Empfänglichkeit er die Anregung durch den grossen Naturforscher aufnahm und in sich verarbeitete.")

2 as *e.g.*, to point at only one thing, the fine idea, in the *Phaedrus*, of the divine madness of the genuine poet. That, however, in the *Timaeus* Plato would have adopted the Democritean elements doctrine and given it a mathematical form, as also Julius Stenzel contends ("Platon und Demokritos," *Neue Jahrbücher* 45 [1920] 89–100), following Eva Sachs ("Die fünf platonischen Körper," *Philologische Untersuchungen*, Heft 24, Berlin, 1917), will turn out to be a mistake (cf. p. 468ff).

the existence of the gods is aiming at Democritus as well as at Empedocles, just as is the outspoken sentence (887C, D): "For it is just necessary to abhor and hate those men who have been and still are the cause for us of these arguments (sc., about the existence of the gods)." (ἀνάγκη γὰρ δὴ χαλεπῶς φέρειν καὶ μισεῖν ἐκείνους, οἳ τούτων ἡμῖν αἴτιοι τῶν λόγων γεγένηνται καὶ γίγνονται νῦν, κτλ.)

In conspicuous contrast to Plato, Aristotle mentions the name, and quotes and discusses the teachings, of Democritus frequently and with highest appreciation and respect.

When reading such passages as, *e.g.*, De gener. et corr. I 2. 315a35ff., one would never expect that in far distant centuries the names "Aristotle" and "Democritus" would be the slogans of parties implacably fighting each other ...

Epicurean Bowdlerization

With regard to certain features of the Democritean doctrine, it can be understood that, by constructing a continuous chain of teacher-disciple relationships, ancient tradition tried to establish a direct connection between Democritus and Pyrron the sceptic. It has been shown in the foregoing how it was possible to interpret some teachings of Democritus in such a way as to make him the initiator of a radical scepticism.

That this was actually not in agreement with what Democritus had in mind himself can be gathered from the fact, reliably reported, that he has decidedly rejected the relativistic and sceptic teachings of Protagoras who, as we have pointed out, could very well have been originally a disciple of his. But that such things were possible at all is proof that there were indeed some footholds for these misinterpretations in Democritus' teachings.

Much more damage, however, has been inflicted upon the original atomistic doctrine through its bowdlerization by Epicurus (342–271 B.C.).

Democritus would have preferred finding one problem solution to becoming the king of Persia. Nothing of the kind could apply to Epicurus who was in fact not genuinely interested in explaining any natural phenomena. He did not care to know of the world more than on what depended pleasure and displeasure. For him, the world exists that we may accommodate ourselves in it as comfortably as possible.

Epicurus adopts Democritus' mechanistic atomistics not out o

interest in any natural philosophy for its own sake. Instead, he expects of it redemption from the fear of any post-existence, from the fear of any gods who could perhaps interfere with human fate and could reward and punish. He does not deprive the gods of their existence. According to him, they just do not care to interfere. They do neither reward nor punish nor shoulder the burden of providence. Man is too tiny a trifle for the gods to mind him. They do not even dwell in the worlds, but in those interstices, never destroyed, between the destructible worlds. Thus, they are no concern of ours. And we, living within the worlds, are no concern of theirs.

That is why Epicurus adopts the atomistic doctrine. But this is done in such a naive and careless way that he makes quite a mess of it.

He, too, assumes atoms blindly moving by themselves, though. But according to him, they originally fall downwards in parallel paths, and all of them with the same velocity! What is "downwards" supposed to mean if there is not yet even an earth? And why with the same velocity if they have unequal sizes? And then, to top all that, since after all he cannot get anywhere with such eternally parallel motion of equal velocity because in this case the atoms would never meet, he simply declares that finally the atoms "without any cause" deviate from the perpendicular a little bit and that in this way the worlds come about . .

Nevertheless, despite this deplorable bowdlerization of the brilliant Democritean hypothesis into a shallow "enlightenment," from then on and particularly since the versification by Lucretius Carus (96–55 B.C.) in his *De rerum natura*, "Democriteanism" and "Epicureanism" were used as virtually synonymous.

Already the Christian writers, above all Dionysius the Great of Alexandria, did not pay much attention to the differences of the doctrines (cf. p. 410) and saw merely those traits common to both which they understandably were up in arms against from the Christian standpoint. And the more Christianity grew and spread as a spiritual power in later antiquity, the more the great philosopher of Abdera turned for the public at large into a sorcerer, magician, and conjurer to whom all sorts of gruesome recipes of black magic could be ascribed in blatant forgeries circulating under his name.

Survival and Revival

Yet, in spite of all that, the philosophy of Democritus was not annihilated. It survived. When after the turbulent centuries of the Great Migration new centers of learning and culture came into being and an admiring interest in the achievements of ancient Greece grew ever more, also the teachings of atomism found their defensors and admirers before long.

As early as the twelfth century, the doctrine of the atomistic structure of matter – without any atheistic implications, of course – was adopted and defended, almost simultaneously, by so heterogeneous personalities as the amazing Englishman and first translator of Arabic writings on natural science and medicine, Adelard of Bath; the grammarian, astronomer, physiologist, psychologist, and natural philosopher William of Conches (1080–1145), one of the many brilliant scholars of the School of Chartres; the unknown author of the treatise *De generibus et speciebus;* but likewise also the mystic Hugo Count of Blankenburg (1096–1141), canon of the Augustinian abbey of St. Victor near Paris.

Were these facts proof that atomism was still alive, there was a downright revival two centuries later. The cosmology of Nicolaus of Autrecourt is completely Democritean in character. The ultimate elements of material things are the atoms, he says. All occurrences are merely changes of place essentially, just "congregation" and "disgregation," union and severance of the eternal atoms. And there is no evidence of any purpose, any *finalitas*, of the world occurrence.

Of course, Nicolaus had finally to retract – on November 25, 1347, at the University of Paris – these and other heterodox theses. But nonetheless many of them were afterwards quite openly taught and professed, and thus ultimately reached and influenced the champions of modern science and philosophy, Galileo (1564–1642), Descartes (1596–1650), Newton (1642–1727) . . .

'Democritus' versus 'Aristotle'

Two hundred years after Nicolaus of Autrecourt, the production of an atomistic doctrine, as contrasted to Aristotelianism, was requested for general philosophical reasons by the French jurist Jean Bodin (1530–1596) in his posthumous work, *Universae naturae theatrum*. This started a sequence of publications in favor of Democritus and against Aristotle.

In 1601, there appeared in Paris a *Philosophia epicurea, democrita, theophrastica* by the Englishman Nicolaus Hill.

In 1621, the physician Sebastian Basso advanced in his *Philosophia naturalis* a corpuscular theory of his own. He assumed unchangeable

atoms, but replaced the Democritean empty space with an animate world ether. Wisely enough, Basso published his book in Switzerland, in Geneva, for in France he would have got into trouble with the powerful Aristotelians. And as a matter of fact, they were in such influential positions that in 1624 a public disputation in favor of atomism, to be held in Paris by Etienne de Clave, was forbidden by decree of the Parliament.

But other Frenchmen lived in Italy and thus could not be kept by the ruling French Aristotelians from pronouncing their belief in atomism. In 1643, Claude Gillermet de Bérigard (1578–1663) publishes his dialogue *Circulus pisanus* in which he presents the substances as consisting of punctiform, spherical atoms, but holds that it is not yet possible to decide whether the assumption of an empty space between them is admissible. For, he says in an argumentation not philosophical but physical, thus far the experiments are not yet sufficient to justify such an assumption.

Still more impressive was the publication in Pavia, in 1646, of the challenging book *Democritus reviviscens sive vita et philosophia Democriti* by the Frenchman Joannes Chrysostomus Magnenus. He praises the atomistic doctrine of Democritus as "the most excellent of all attempts to understand the composition of the continuum," but deviates from the original teaching in that he postulates only a finite number of atoms and bestows upon them an ability of changing their shapes despite their indivisibility.

The greatest impulse, however, to the spreading of atomism is due to the lifework of Pierre Gassendi (1592–1655). He embraced the doctrine not in the original, Democritean form, though, but in its Epicurean adulteration, with weight as a primordial property of the atoms in addition to shape, size, and solidity. But his defense of atomism with physical arguments, such as his speculations about the nature of the gases, was of tremendous consequence for the development of modern natural science, and there is a straight, uninterrupted line from Gassendi to the atomism of today.

In the beginning of his endeavors, Gassendi was still strongly hampered by the official prohibition of any writing or lecturing about atomism. But all obstacles were removed when in 1649, in the detailed commentary to his Latin translation of Book X of Diogenes Laertius, Gassendi who was himself a Catholic priest had managed to construct a compatibility of Epicureanism with Christian tenets. Then he could write a regular presentation of the Epicurean system and finally his own philosophy, based on it (published after his death).

Yet, philosophically the fight continued, all the same. The contrasts, in their undiluted forms, appeared to be irreconcilable. Blind necessity and purposeful steering of the universe, mechanism and teleology, Democritus and Aristotle – no bridge seemed here to be possible. Until Leibniz gave the answer: Mechanism prevails without exception, it is true, but the whole mechanism in itself is the means for the realization of an end.

When, in his desire "to reconcile Democritus with Aristotle," Leibniz arrived at this solution, he was no doubt overjoyed to find the same formula in Plato's *Timaeus:* There is an overall Demiurgeic purpose of the natural necessity, the *theion* of the *anankaion*. And Leibniz might have even remembered that this Platonic tenet had been fervently embraced also by St. Augustine, the former neo-Platonist . . .

From the revival of Democriteanism there is a straight line to modern science and modern materialism. All the excellencies, but likewise all the deep-seated, irremovable, intrinsic shortcomings of the system of Democritus have been inherited by his modern epigones, deficiencies that, in science, make the doctrine useless for problems beyond physics, chemistry, and physiology and, in philosophy, are the reason why materialism is the crudest and most naive metaphysics.

None of those mortal defects is present in the fundamentals of the system of that man who refused to accept young Democritus as a disciple. Should perhaps the time have come for a revival of Anaxagoras?

4. THE PYTHAGOREANS

INTRODUCTION

The various groups of Agenetists differ from each other in what exactly is considered unchangeable.

There is a group to whom the unchangeable proper is neither the various irreducible sense qualities nor the tiny solid corpuscles of the four elements nor any demons nor even the sizes and shapes and velocities of any ultimate particles of a solid stuff. To this group, certain planes are the unchangeable: certain triangles, quadrangles, and pentagons.

The Peratists

Those assuming such planes as the really unchangeable were in fact a peculiar sort of atomists. They were even the oldest atomists of them all, obviously.

Their atomism has not the form of a doctrine about solid corpuscles, but about hollow, or rather quasi-hollow corpuscles: planes encompassing some space. To be specific: inside such an "atom" is *apeiron*, and outside roundabout there is *apeiron* again. It shall be left undecided for a while whether here that *apeiron* means a nothing, an empty space, or perhaps something positive that would be a nothing as to motion resistance only.

Here indeed only the planes are the unchangeable. For when an octahedron, for instance, is dissected into two pyramids without bases, and these two pyramids then are bent in their edges so as to form tetrahedrons, it is the planes, not the corpuscles, that remain unchanged, the *peirata* (πείρατα), or "borders." This group, therefore, could fittingly be called the Peratists among the Agenetists. And accordingly, when these Peratists declare that one octahedron turns into two tetrahedrons, this does not refer to the cubic contents, but to the area.

The Peratists among the Agenetists were the Pythagoreans, or rather the Old-Pythagoreans. For one has to draw a strict distinction between the early, original Pythagoreans and the later ones.

"About Pythagoreanism and its founder, tradition knows to tell us the more, the more distant in time from these phenomena the tradition is, whereas it grows ever more taciturn, the more we approach in time to the subject matter itself." This famous dictum by Zeller tells only half the truth. It has to be completed by another even more important observation: The more we go back in time, the more sober becomes everything one can find out about the Pythagoreans, and the nearer we come to later antiquity and the Middle Ages, the more phantastic turns everything. All that cabbalistic number and word mysticism and symbolism, all that "dark cloudiness" and "nebulosity and fogginess" of an alleged "Pythagorean mysticism" belongs to the later period and is not to be found with the Old Pythagoreans.

When taking the Pythagoreans as a group among the Agenetists, or as natural philosophers for that matter, one has to keep in mind that only one facet of Pythagoreanism is covered by that. It has become almost a commonplace statement today that there are two strains in Pythagoreanism, a more religious one and a more scientific one. But this is much too little. Taken as a whole, the Pythagorean movement will have to come under a much broader notion. However, this shall not yet be discussed. Suffice it for the time being to say that, when the philosophical side will have been dealt with, the Pythagoreans will be treated anew under quite a different heading.

It is not without good reason that here not Pythagoras, but the Pythagoreans are discussed.

Everybody can look up the reference books, encyclopedias, etc., about Pythagoras. There one will find quite a lot of things that are believed, or in olden times were believed, to be sure knowledge about him. Yet, at a closer look one arrives at the insight that in fact we know nothing reliable about Pythagoras, or almost nothing. For nothing has been put down in writing by himself obviously, in the first place.

Of the various statements about his lifetime the most reasonable seems to be 568–ca. 493 B.C. Very probably correct might be the tradition about his sojourn in Egypt. That he emigrated from Samos to Southern Italy can safely be accepted as an established fact. That he allegedly was a religionist only, without scientific interests, is certainly wrong. For in this case Heraclitus could not have mocked at his "polymathy."

Philolaos

Not before Philolaos, a contemporary of Socrates', have writings containing Pythagorean tenets been published.

Nobody has ever doubted that Philolaos is an historical personality. For he is mentioned by Plato as well as Aristotle. But as to the extant fragments going under the name of Philolaos, it has become fashionable to brand them as the forgeries of some post-Aristotelian writer, based on certain passages in Aristotle about Pythagorean teachings, or at least to ascribe them, as does v. Wilamowitz, to some other Pythagoreans, but certainly not to Philolaos.

The most recent adherent of this school of thought is a young Englishman by the name of J. E. Raven who, however, in a remarkable fit of common sense, becomes for a moment alive to the insight that "parallelisms of this sort" (sc., between the alleged Philolaos fragments and certain passages in Aristotle) "are, of course, notoriously two-edged weapons: even when they are established as

more than accidental, it is often no less convincing to maintain that A used B as his source than that B used A."[1]

Yet, one may safely leave it to the philologists to shoot it out whether those fragments attributed to Philolaos are genuine or forgeries or genuine but not by Philolaos. At any rate, what they contain is genuinely Pythagorean, and this alone matters, philosophically. The criterion for such an assertion? It is the extra-philological criterion of inner consistency, based on the technique of composition.

The Five Bodies – 'Pythagorean' or 'Platonic'?

There is another point that has to be cleared up. In all antiquity as well as in modern times until some decades ago, nobody had ever any doubt that the elements doctrine in Plato's dialogue *Timaeus*, and especially the employment of those most regular bodies for the shapes of the ultimate particles of the elements, stems from Pythagorean sources.

But then it was found out that no solid geometry, or stereometry, was in existence before Plato's time, this being a brand-new invention by Theaetetus, a younger contemporary of Plato's. And since those most regular bodies are made use of for the first time in Plato's *Timaeus*, it is today again, as already sometimes in antiquity, considered due and proper to call them not the Pythagorean, but the Platonic bodies (Πλάτωνος σχήματα). Therefore, it is said, the Pythagoreans of the time before Plato, Philolaos included, simply cannot have known those bodies, except "empirically" two or three of them, because there just was not yet any solid geometry in existence.

Since the publication, in 1917, of the brilliant book *Die fünf platonischen Körper* by Eva Sachs, this has become a downright dogma.

This dogma seems to have been somewhat shattered recently, to gather from a statement in the monograph, cited above, of Mr. Raven. There, on p. 151, he mentions an unpublished dissertation on *The Concept of Continuity* by a Mrs. Markwick and quotes her as concluding: "On the whole it seems most likely that the Pythagoreans knew of the five regular solids considerably before Plato, and had gone some way towards constructing them geometrically." This is interesting indeed, and it is a pity that this paper has not been published and thus is not accessible.

But much more interesting is another fact, a fact almost miraculous. At least seven years before the publication of that famous writing by

[1] *Pythagoreans and Eleatics*. Cambridge, 1948, p. 99.

Eva Sachs, a reconstruction of the Old-Pythagorean elements doctrine was written, a reconstruction clearly demonstrating that the discovery of those five regular bodies was completely independent of the existence or non-existence of any solid geometry because they can be found, and of course had been found by Pythagoreans long before Plato, by way of purely planimetrical construction. The whole admirable edifice of Eva Sachs, therefore, with all its consequences collapses because its fundament, the fundamental presupposition, is wrong.

This reconstruction was superscribed, *Die altpythagoreischen Elemente der Welt*, and was written by Adolf Stöhr who in 1910 lent his manuscript, with the permission to copy it, to me, at that time a young student at the University of Vienna. Stöhr has never published that manuscript. He was obviously kept from doing so by bigger projects.

In the following presentation, I am going to quote extensively and literally (in English translation) from this precious heritage wherever feasible and appropriate.

THE TEN ELEMENTS OF THE WORLD

To say that the Pythagoreans are peratists is tantamount to saying that they have, and operate with, the notion of a plane matter, in contradistinction to a cubic matter, such as that of Democritus.[1]

At a first glance, it may seem somewhat strange to think of a plane matter as impenetrable. It might appear more plausible to think of impenetrability if solid corpuscles were involved.

But at a closer look, one will find that after all even with Democritean cubic matter there is impenetrability only on the surface. Furthermore, that matter which we see, in the physiological visual space, is merely a plane, or a combination of planes, anyway. Actual vision is indeed plane, and cubic it becomes only by our adding of kinaesthesy, a fact firmly established already by Berkeley in his *Essay towards a new Theory of Vision* (1709). The so-called Euclidean space, however, is just a formula and can be comprehended even by a blind person (whereas a seeing, but paralysed person perhaps could

[1] It has been overlooked that in the *Timaeus*, the synthesis of almost everything that was before, Plato operates with both kinds of matter, the cubic and the plane one as well.

not). The Pythagoreans, therefore, could have as an argument in favor of their peratism the fact of vision if taken without prejudice.

But in addition, there was something that in a way virtually forced the Pythagoreans to operate with a plane matter, an external situation that presumably had even more impact than the fact that visual space is plane: There did not yet exist any solid geometry, not even in the day of Philolaos. Yet, if one is bent on computing – and that the Pythagoreans were born mathematicians and excellent number theorists, this not even the fiercest of those modern iconoclasts who would like to scrap everything have dared to deny as yet – if one is bent on computing, then one must, of course, compute those things which one is just able to compute.

Democritus who likewise lived before the invention of solid geometry was in a position to take it easy in this respect despite the solidity of his atoms. For he did not compute. The Pythagoreans, however, had to accommodate their assumptions to their capacity of computing.

Five Bodies – Five Elements

What sort of bodies can be built up with those plane triangles, quadrangles, and pentagons, and without solid geometry? For those bodies were indeed found, not by way of stereometrical construction, but by way of planimetrical playing.

Those triangles are not just any triangles, but equilateral triangles. Those quadrangles are not just any quadrangles, but squares. And those pentagons are equilateral, equiangular pentagons.

Four such triangles join to a tetrahedron, eight to an octahedron, twenty to an icosahedron; six of such quadrangles form a cube; twelve of such pentagons, a pentagon-dodecahedron.

Notionally, the regularity of these "most regular" bodies is held together by the equality of the angles in each corner and the equality of the edges. There are, namely, various reasons possible why figures can be called "regular." Under a different notion, also the isosceles triangle is "regular," and so is the rhombus.

It turns out that there are indeed only five such bodies possible.[1] To construct a sixth is impossible. For in this case, the result is merely a plane figure incapable of being bent into a body.

There are, then, five most regular hollow bodies, formed of unde-

[1] It has been suggested that those most regular bodies might have been found originally by way of the empirical observation of crystals. This appears to be wrong since all of those bodies are not to be found in nature.

stroyable planes. And these same bodies will also be the constituents of the various stuffs, according to the Pythagoreans. Since there are only five such bodies, there are also five elements, they say.

This in itself implies already a certain argumentation: If you want to find out the secrets of nature, do not set out from crude experience, but attack these problems from the geometrical side.

The Pythagoreans were doing research also in music, but insofar as frequencies of oscillation and lengths of strings were concerned, and not the sounding, audible tones. This obviously means an approach to the subject from the optical side, the geometrical side. Apparently, this was their method not only in dealing with music, but with everything they wanted to study.

Exactly the same is meant by Kant when he says that in any field of knowledge there is only so much of real science as there is mathematics in it. And all our modern physicists who in acoustics, *e.g.*, interest themselves not in the tone, but in the visible oscillations and, in optics, do not care for the colors and lights proper, but for vibrations and oscillations of an unknown something or, as it formerly was usual to call it, of ether, all these physicists are just as many Pythagoreans.

The idea is, then, to attack all the problems of natural science and philosophy from the mathematical-geometrical, the optical and quantitative side, and not from smell, taste, etc.

True, also Democritus has quantitative and figurative hypotheses, but only after the qualitative hypotheses had been exhausted. The Pythagoreans, however, have them from the very outset. Besides, there is still another decisive difference. It is one thing to say: you will achieve exact results only with this method, and quite another thing to say: the data of the senses are but seemingly real.

That basic Pythagorean viewpoint manifests itself already in the assumption of five elements. For what would have been the reason for the claim that there should be four elements? Merely that air and earth and water and fire are somehow conspicuous?[1] This is no basis. But mathematically, you can say: There are definitely neither more nor less than five bodies with equal edges. Consequently, there cannot be more or less than five elements.

(Well, even so – there is here still a tremendously naive presuppo-

[1] Incredible as it may seem, there are indeed among philologists some who obviously believe that those conspicuous four stuffs "were not known (!!) until Empedocles introduced them" (Raven, *l.c.*, p. 150). This is a blatant confusion of knowing those stuffs with bestowing upon them the rank of ultimate constituents of the world.

sition involved. For who says that the ultimate particles must be most regular?)

The Five Stuff Elements

When pondering about all that, we might arrive at a feeling that somehow it does not yet give us full satisfaction.

To look at the Pythagoreans from the viewpoint of Agenetism is perfectly justified, though. Yet, it does not seem to have been the Pythagoreans' own and conscious purpose just to look for something unchangeable. They rather wanted to build up an imitation of the structure of the world. For such a construction, however, those plane figures, those triangles and quadrangles and pentagons, do not yet seem to satisfy as a start.

This appears to be the right moment for making accessible to the reader what Adolf Stöhr has written about the Old-Pythagorean doctrine.

* * *

The ancient Ionian natural philosophers endeavored to reduce the multitude of perceptible stuffs to one, sole primary stuff.

Of the Milesians, Thales and Anaximenes singled out one of the perceptible stuffs to be the primary stuff of all the others, Thales by choosing water, and Anaximenes, air. Heraclitus of Ephesus chose fire that, however, before the origin of this world when there was not yet a sun, uniformly filled the world space not as red heat and burning fire, but as the life-warm, luminous body of an eternal Logos.

Anaximander the Milesian went one step deeper. He assumed a primary stuff – the *apeiron* – that by its differentiation into the perceptible stuffs has been exhausted and, therefore, cannot be exhibited any more today. This primary stuff did not have any of the properties of the stuffs now existing. Its own properties are beyond the reach of our searching. For, due to its transformation into the many perceptible stuffs, it does not exist any more and will not appear again before the next world dissolution. (The *apeiron* of Anaximander could also be quite differently interpreted: as a finest mixture of the undefinably numerous perceptible stuffs, a mixture that merely dissolved subsequently.)

All of these wanted to let the plurality of material things originate from one, sole kind of a *three-dimensional* material (three-dimensional as to the point, that is).

The Pythagoreans undertook to tackle the problem more profoundly: they tried to let the plurality of material things originate from one, sole kind of something *one-dimensional:* a straight line of finite size, the World-Production-One, the Cosmogony-Monad, so to speak.

We find as handed down, and ascribed to Philolaos, only the result of the reasoning, not the reasoning itself. The fragment reads as follows:

> And the bodies of the sphere are five, those within the sphere – fire and water and earth and air – and what is the cargo-ship of the sphere, as the fifth.
>
> καὶ τὰ μὲν τᾶς σφαίρας σώματα πέντε ἐντί, τὰ ἐν τᾷ σφαίρᾳ πῦρ <καὶ> ὕδωρ καὶ γᾶ καὶ ἀήρ, καὶ ὁ τᾶς σφαίρας ὁλκάς, πέμπτον.
>
> *Stob. Ecl. I 3; 44* [1] *B 12.*

Curiously enough, their reasoning has resulted not in four, but five elements.

With fair probability, we might succeed in reconstructing the Pythagorean train of thought by a closer look at the geometrical forms attributed to the ultimate particles of those five elements. In Aetios II 6, 3 (VS 44A15), there is the following statement:

> Since there are five shapes of solids which are called also the mathematical ones, Pythagoras says that from the cube the earth has originated, from the pyramid the fire, from the octahedron the air, from the icosahedron the water, from the dodecahedron the sphere of the Whole.
>
> Πυθαγόρας πέντε σχημάτων ὄντων στερεῶν, ἅπερ καλεῖται καὶ μαθηματικά, ἐκ μὲν τοῦ κύβου φησὶ γεγονέναι τὴν γῆν, ἐκ δὲ τῆς πυραμίδος τὸ πῦρ, ἐκ δὲ τοῦ ὀκταέδρου τὸν ἀέρα, ἐκ δὲ τοῦ εἰκοσαέδρου τὸ ὕδωρ, ἐκ δὲ τοῦ δωδεκαέδρου τὴν τοῦ παντὸς σφαῖραν.

In the aforementioned fragment, the fifth element is called "cargo-ship of the sphere"; in Aetios it is called "the sphere of the Whole." The one expression is ascribed to Philolaos, the other, to Pythagoras. These two terms cannot have the same meaning. Something is either the cargo-ship of the sphere or it is the sphere itself.

If the dodecahedron is compared to a cargo-ship, then the world sphere is inscribed in a gigantic dodecahedron the same way as the cargo is contained in a cargo-ship, and the fifth element has only one gigantic atom, just this dodecahedron, or world-box. If, however, the fifth element is the sphere itself, then the cargo-ship becomes completely superfluous, and the ultimate particles of the fifth element are tiny dodecahedrons, piled up to the gigantic world sphere and filling the interstices between the particles of the other elements.

[1] In the Stöhr manuscript, the quotations were according to the 2nd ed. of Diels. I have changed the numbers according to the later editions.

Now, the expression in Aetios "sphere of the Whole" is altogether unsatisfactory. The interstices between the particles of the other elements cannot be perfectly filled in with those small dodecahedrons, but merely stuffed incompletely. Such geometrically insufficient stuffing would physically hinder any movement of the bodies. One simply cannot understand how that fifth element should have made sense if indeed it consisted of a great number of small dodecahedrons. Nor can one see any reason why the dodecahedrons should pile up exactly to a ball.

From times immemorial, interpretation of the word *holkas* in the term *holkas tas sphairas*, "cargo-ship of the sphere," has been an embarrassment to non-Pythagoreans, and obviously also Aetios wants to evade this embarrassment. The strict difference between cargo-ship and sphere is blurred, "cargo-ship of the sphere" is changed into "sphere of the Whole," and this, in turn, is interpreted as an empty space in which the other four elements are contained as fillings.

Let us keep to the precise expression of Philolaos who calls the fifth element "cargo-ship of the sphere" and adopt, in addition, Aetios' statement that the fifth element has the shape of a dodecahedron. Let us, furthermore, take into consideration also the elements speculation, stemming from Pythagoreanism, in Plato's *Timaeus*. Then, thereupon, we may venture an attempt at reconstruction.

The 'Power in the Monad'

Let us imagine, to begin with, there is nothing but the Apeiron – an infinite space homogeneously filled with an absolutely penetrable X – and in it a finite piece of a small straight line, to be called a Production-One, or Production-Monad.

Now from that line a plane with the smallest number of sides shall originate, as it were, and without the help of a second line, which is to say, only by means of a gyratory self-movement of that line:

If in each of the two terminal points the line turns away from its position by 60°, and so that the new terminal points meet, the result is an equilateral, plane triangle.

Only one line has been required for the "production" of this triangle. All the other triangles are beyond the possibility of production from one, sole line, beyond the *dynamis* (δύναμις) of a *monas* (μονάς), the "power of a One." They have, therefore, no place in a cosmology with the ideal of forming the world in the *apeiron* from one, sole element.

True, also the equilateral triangle has three different sides. But they are "one-like" (*henoeides* [ἑνοειδής]), insofar as they have resulted from the self-multiplication of one identical side. They are "of unsplit origin" (*aschistos* [ἄσχιστος], "unsplit" [sc., as to origin]). In the same sense, also the three equal angles are "one-like" and "of unsplit origin":

The first triangle, namely, is the equilateral one that somehow has (only) one line and angle: I say "one" because it has equal ones. For the equal is always unsplit and one-like.

πρῶτον γάρ ἐστι τρίγωνον τὸ ἰσόπλευρον, ὃ ἔχει μίαν πως γραμμὴν καὶ γωνίαν· λέγω δὲ μίαν, διότι ἴσας ἔχει· ἄσχιστον γὰρ ἀεὶ καὶ ἑνοειδὲς τὸ ἴσον.

Theologumena arithm. p. 61 Ast; 44A13.

The equal by nature stems always from self-multiplication and, therefore, is always "of unsplit origin" and "one-like."

The straight line could also, by turning around its centre point, describe a circle in the plane. Such circle, however, would not be a one-like figure of unsplit origin. For then there would be two kinds of line, the straight diameter and the crooked circumference. The circle would not be a self-multiplication of the diameter, not a production of something homogeneous, but merely a heterogeneous line that is to the diameter as a manufactured thing is to the tool, not as a descendant is to the procreator.

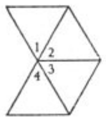
The equilateral triangle is not yet a possible ultimate particle of an element, for it does not yet encompass any space. To obtain from the equilateral triangle a body with the smallest number of surfaces, one can first turn the triangle in each of its corner-points by 60°. The result is the following plane figure:



This figure has been produced by the turn and self-multiplication of the triangle, the same way as the triangle by the self-multiplication of the straight line.

If in the lines of the inner triangle the other three triangles are bent upwards, the product is a *tetrahedron*, or *pyramis* (πυραμίς). This is the form of the ultimate particles of the lightest, most mobile element that most easily gets through interstices: the *fire*.

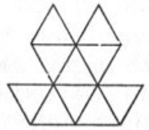
To obtain the body next in number of surfaces, one will turn the equilateral triangle in one of its corner-points three times by 60° and thus quadruple it:



By bending the triangles upwards in the lines, a foursided pyramid is produced that is open at the bottom. Two such pyramids, put together at their open bases, include a space and form an *octahedron*. This is the

figure of an ultimate particle of an element heavier, less mobile, and less easily penetrating than fire, but lighter, more mobile and penetrating than anything else. This element is the *air*.

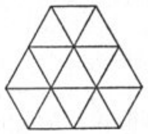
The body next in number of triangles will come about if, by turning the triangle in each corner four times by 60° and in this way multiplying it, five triangles are made to meet in each corner-point:



The producing triangle is in the middle. In each of its corner-points, a "five" has been produced out of a "one." Some of the products are congruent.

By bending the triangles upwards in the lines, the shape of a small basket is formed. Two such baskets encompass some space and join into an *icosahedron*. That is the figure of an ultimate particle of an element heavier, less mobile, and less easily penetrating than air and fire, yet lighter, more mobile, and more penetrating than anything else, and that is the *water*.

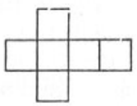
If now we let six triangles meet in each corner-point by turning the producing triangle five times by 60° in every corner, the result is a figure that cannot be bent up any more into a body:



Hence, the possibilities of body production by way of the self-multiplication of an equilateral triangle have been exhausted with the tetrahedron, the octahedron, and the icosahedron, or fire, air, and water.

Yet, the "power in the One," the *dynamis en te monadi*, the generative power in that straight line of finite size, has not arrived at its end by that.

The straight line can turn in its terminal points by 90°, and the new lines in the new terminal points again by 90°. When the lines produced in the second turning have come to congruence, a plane square has been made. The square cannot encompass any space. But when it has multiplied by turning around each cornerpoint, and one more square is added by self-reduplication, the resulting figure by being bent over in the lines can be closed to a cube:

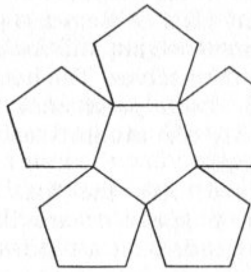


The *hexahedron*, or *cube*, is the figure of the ultimate particles of that element which will easily form aggregates. Such aggregates, by their very aggregation and for the duration of their aggregation, are given the property of solidity. This element is the *earth*. In consequence of their perfectly tight union, aggregates of particles of this element will in water go down.

The generative power of the square is finished with the cube. If we let not three but four squares meet in one point, we get no such figure any more as could be bent up into a body.

The power in the world-production-monad is still not exhausted.

If we turn a straight line in its terminal points by 108° and in each of the new terminal points again and again by 108°, the result is a pentagon, surrounded by five more pentagons:



By bending the surrounding pentagons inwards, we obtain a small basket. Two such baskets close to a *dodecahedron* that consists of equilateral pentagons. This will be the shape of the fifth element.

The Fifth Element

To find out what the fifth element is, let us return to the production-monad when the tetrahedron originated from it.

This fire atom consists only of severing or limiting surfaces. It is a *perainon* (περαῖνον, "something that limits"). Inside, it is filled with a segment of the *apeiron*. Outside, it is surrounded by *apeiron*.[1] The inner *apeiron-filling* is a property of the atom. The outer *apeiron-surrounding* is something *in which* jointly all the other atoms are embedded, and in which, *not from which*, all the atoms have originated.

If we imagine the *apeiron*-filling and the *apeiron*-surrounding as not being there, the atoms of the first four elements become empty hollow bodies. Inside is nothing, and outside is nothing, and the border-surfaces between two nothings are likewise nothing. In other words, those *perainonta* cannot exist at all without an *apeiron* from which they cut parts out, and in which they are embedded.

[1] For illustration, this is sometimes compared with an acre and the ridge as its border. The ridge of the acre is compared to the *perainon*, and the acre to a piece of *apeiron*. The ridge is the border between that plot of land and the rest of the whole surface of the earth. Outside is earth, and so is inside.

If we omit the first four elements and imagine the *apeiron* as existing alone, there will be, though, a homogeneous filling of an infinite space with a quality X. But such homogeneous filling could not be called a world since neither things nor occurrences would be possible in it. According to the report in Stob. Ecl. I 21, 7a (44B2), Philolaos says:

> As a matter of (logical) necessity, the existing (things) in their totality are either limiting or limitless or both limiting and limitless. Yet, they could not exist limitless alone or limiting alone.
>
> ἀνάγκα τὰ ἐόντα εἶμεν πάντα ἢ περαίνοντα ἢ ἄπειρα ἢ περαίνοντά τε καὶ ἄπειρα, ἄπειρα δὲ μόνον <ἢ περαίνοντα μόνον> οὔ κα εἴη.

This indispensable *apeiron* is not perhaps the fifth element. It is the common precondition for any class of elements particles. The first four elements and that fifth element we are still looking for are *perainonta*, or border-surfaces closed in themselves. The homogeneous space-filling is *apeiron*. The universe is both *perainonta* and *apeiron* together. *Perainonta* alone with nothing else are impossible. *Apeiron* alone does not yield a differentiated world.

The chief question is now: Are the first four elements spread everywhere in the infinity of space or are they at one place held together into a world surrounded on all sides by the homogeneous *apeiron?*

According to common Greek opinion, our world is finite and relatively sharply circumscribed. Should Anaximander [1] have assumed an infinite number of simultaneously existing worlds, then this is no hindrance to imagine the individual units within that infinity as strictly limited.

The Pythagoreans believed that the first four elements were contained in a finite space terminating with the celestial vault which they called Olympus. They were compelled, therefore, to assume something that would hold those elements together, keeping them from dissipating and getting lost into that infinite space homogeneously filled with an absolutely penetrable X, though, but void of elements.

This skin around the whole, this box, this cage, this prison, is itself a *perainon*, a closed border-surface, just like the atoms of the first four elements, but of a different magnitude. The production-monad for this figure is many times larger than the production-monads for the small atoms of the first four elements, but still of the same kind: a straight line of finite length and equipped with the same manner of production. Thus, we have a gigantic atom of a fifth element, and here element and atom materially, though not conceptually, coincide.

This giant-atom is so big that all the atoms of the first four elements are within it, that is to say, in the space encompassed by its surfaces. These small atoms are embedded in the *apeiron*-filling, and this filling,

[1] and Anaxagoras.

in turn, is itself a piece cut out from the infinite space-filling by the surfaces of that giant-atom.

The interior spaces of the small atoms are likewise cut-out pieces of the *apeiron*-filling. The giant-atom, on the other hand, is also surrounded outside by homogeneous *apeiron*.

The apeiron-filling is no motion hindrance for the small atoms since it is absolutely penetrable. For it is neither air nor something like air, but just an X. Motion resistance rests upon the *perainonta*, the border-surfaces, not upon the *apeiron*.[1]

To this giant-atom of the fifth element the still available figure of the *dodecahedron* was ascribed by Philolaos. And he called that atom *holkas*, "cargo-ship," which at the same time is the name of the fifth element itself since here, as already mentioned, we have the rare case of a coincidence of element and atom.

Thus, it is not that the Pythagoreans, as has been frequently assumed, had tried to find an element for an available polyhedron. They made use of an available polyhedron for an element they were compelled to postulate.

The *holkas* itself cannot be seen because it gives no light. Only the celestial vault, the sky, can be seen. That vault is no spherical stratum continuously filled, but a sum of revolving particles of the dark, yet hot fire element. Where such particles are revolving closer together, there also the heat is greater and, as a consequence, the air stratum immediately below vibrates and gleams. These shining spots of the border between the sun-world space and the celestial vault above it, or *sphaira*, are the stars.

The *sphaira*, therefore, is a spherical stratum inscribed in the dodecahedron, or *holkas*. In this way, the expression "*holkas* of the *sphaira*" (τᾶς σφαίρας ὁλκάς) in Philolaos is accounted for.

Holkas means "cargo-ship." The cargo of that ship are the first four elements. The walls of the boat keep the cargo from getting lost into the ocean. The surfaces of that giant-atom keep the first four elements from getting lost into the infinity of space homogeneously filled with an X. Furthermore, the cargo-ship is at rest in the ocean unless it is hauled by another ship [2] or driven by a drift. Likewise, the giant-atom is at rest in the *apeiron* since there is no second giant-atom of the same

[1] There is an analogon to that *apeiron*-filling with an X that offers absolutely no resistance to motion or penetration and yet is no nothing: the Indian conception of *âkâśa*. This is meant to be a space filled with a thing that is neither air nor fire nor water nor earth and still is something. A difference between the Indian *âkâśa* and the Pythagorean *apeiron* is that *âkâśa* is audible while the *apeiron* is not. According to Indian notion, namely, tone is not perceived through air percussion, but through occurrences in the *âkâśa*-filling (cf. Richard Garbe, *Die Sâṃkhya-Philosophie*, 1894, p. 236, and Paul Deussen, *System des Vedânta*, 2nd ed., p. 249).

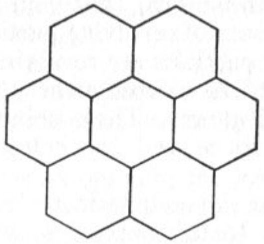
[2] ὁλκάς (from ἕλκειν, "to pull"), a stationary ship that moves only if it is pulled, in contradistinction to ναῦς (*naus*), a ship moved by means of oars or sails.

element, in relation to which it could have, or change, a distance. Nor are there any drifts in the *apeiron* filled homogeneously with that X because there are no elements in it. For only the *perainonta*, the border surfaces of the atoms of the elements, are motion-determining and motion-transmitting, but not the absolutely penetrable *apeiron* that is practically a nothing as far as physics is concerned.

That dodecahedron does not move from the spot nor, by way of rotation, on the spot, just like a true *holkas* when moved by nothing from outside. Even the dodecahedron axis, around which the celestial bodies are revolving, is at rest. It is hardly possible indeed to invent a more characteristic term.[1]

Now only one more thing is required. We have to see whether the generative power of the One is really exhausted with the dodecahedron.

Having already dealt with the triangle, the quadrangle, and the pentagon, we now have to form, by turning a straight line of finite length, an equilateral *hexagon*. If then, by turning it in each of its corner-points, we build one more hexagon over each side of it, we see forthwith that this figure cannot be bent up into a body:



This is proof that in this manner of production no more than five elements can have taken origin.

The generative power of the line-monad is now exhausted. The straight line can still produce heptagons and octogons etc., and, in infinite approximation, the circle. But from that no multiplications originate which could encompass any space.

From this deduction, it is evident that the five equilateral polyhedrons can be found by way of planimetrical construction. Their discovery, consequently, was perfectly independent of the state of solid geometry at that time.

[1] v. Wilamowitz (*Plato* II p. 91 f.), admittedly at a loss to know how to make head or tale of ὁλκάς (*holkas*), takes it finally for an error in writing of some copyist and replaces it by ὁλκός (*holkos*) which means "strap," "cord," "bridle," also "lifting-machine" and also "dockyard," according to Wilamowitz, however, is supposed to mean "volume." Erich Frank (*Plato und die sogenannten Pythagoreer*, Halle, 1923, p. 318), enthusiastically praising v. Wilamowitz, writes: "*Die Schwierigkeiten für das Verständnis .. hat v. Wilamowitz* (Plato II S. 92) *durch seine glänzende Konjektur* ὁλκός *für das überlieferte und unsinnige* (!!) ὁλκάς *aus dem Wege geräumt.*" – One more proof that philology alone is not enough . .

The 'Production' of the Atoms

"Production" of the atoms of the elements by the self-movement of the line-monad can have two meanings. The production of the elements in the *apeiron* can be shoved back into eternity. Then the *perainonta*, in a great, but finite number, are eternally finished and would merely take origin forthwith anew if ever the polyhedrons could be pushed or pressed back into the producing plane and this, in turn, into the producing line. But the meaning could as well be that the polyhedrons are kept in existence by an eternal self-turning of the producing line.

One would have to do violence to the extant texts to give preference to either of the two interpretations.

However, if we ask, not what did the Pythagoreans in fact believe, but what has more intrinsic logic, then an ever new formation and for ever continued preservation might better agree with the self-movement of the production-One. If the production-monad was turning itself only once, only at the formation of the world, why does it not turn itself any more now? If, however, it was turned passively at that time, then the *dynamis*, the power, was not *in* it, but outside it. Yet, it is supposed to be *in* it. In Philolaos it says (·B11):

> One must contemplate the performances and the being proper of Number [1] with regard to the power which is in the Ten (*i.e.*, which is in the world consisting of ten elements).
>
> θεωρεῖν δεῖ [2] τὰ ἔργα καὶ τὴν οὐσίαν τῶ ἀριθμῶ καττὰν δύναμιν ἅτις ἐστὶν ἐν τᾷ δεκάδι.

The power in the Ten, however, rests upon the One, the *monas*, contained in the Ten, the *dekas*. And of the *monas* Jamblichos says (in Nic. p. 77, 9; 44B8):

> Since the One might be the principle of all things, according to Philolaos (for does he not say the One is the principle of all things?) . . .

[1] It is of utmost importance to keep in mind that very frequently what the Pythagoreans call "*number*" has to be interpreted *geometrically*. For they call "numbers" also line, plane, and body. That is to say, "number" is here very often just another word for "extension manifold." When the line is called "number 1," the plane "number 2," and the solid "number 3," it is tantamount to "extension manifold of the first, or second, or third order," with regard to the point as generating element that is. Sometimes, the point as generating element is itself called "number 1," the line "number 2," the plane "number 3," and the solid "number 4." These Pythagorean habits of expression have to be taken into account.

[2] The "must" in "One must contemplate" is in the Greek text δεῖ (*dei*), not χρή (*chre*). That does not mean "one shall," or "should," or "ought to." It means "one must" in the sense of "it is not possible otherwise if you want to get somewhere."

ἡ μὲν μονὰς ὡς ἂν ἀρχὴ οὖσα πάντων κατὰ τὸν Φιλόλαον (οὐ γὰρ ἕν φησιν ἀρχὰ πάντων;) . . .

* * *

The Ostensible Analogy in India

The *holkas* mystery does not exist any more . . .

But it is worthwhile keeping in mind that from times immemorial it had been a *crux philologorum* and, to be honest, a *crux philosophorum* as well. One did not know what to do with it. Some scholars went even so far as to take *holkas* for a bowdlerization of the Indian word *âkâṣa* which means "ether" and also "space." For what the Greek word for cargoship could have to do with the elements doctrine of the Pythagoreans they just were not able to understand.

Those scholars could believe themselves to be on the right track all the more as there seemed to be quite a number of reasons in support of such an assumption. It is a fact that as early as the sixth century B.C. many Pythagorean tenets were well known in India, and that there is a great number of conformities also in unimportant and even strange and queer matters. Therefore, some renowned scholars have come to assume an Indian origin of Pythagoreanism. We shall return to this question in due time.

As far as the number of the elements is concerned – for it is indeed striking that nobody else among the Greeks has five elements while the Indians have – let us listen to Stöhr's elucidation:

* * *

There is a superficial similarity between the pentad of the Pythagorean elements and the pentad of elements in India, particularly the origination of five elements from the *prakṛti* in the system of the Sâṃkhya philosophy (cf. Leopold von Schroeder, *Pythagoras und die Inder*, Leipzig, 1884, and Richard Garbe, *Die Sâṃkhya-Philosophie*, Leipzig, 1894, pp. 90–96).

However, the conformity in the number of elements is merely an accidental coincidence. For with the Indians the pentad is arrived at in a completely different way, by the clue, namely, of the sense organs, or *golaka*'s, of the coarse-material body and the faculties of sense perception, the *buddhîndriya*'s. To the ear and the faculty of hearing corresponds ether, *âkâśa*, because tone production takes place in the ether, not in the air, according to Indian view. To the sense organs of the skin and the respective sense faculty corresponds air, *vâyu*, because it is felt. To the eye and the faculty of seeing corresponds fire, *tejas*, because fire, light, and color are seen. To the tongue and the faculty of taste corresponds water, *ap*, because it is tasted. To the nose and the faculty of smelling corresponds earth, *pṛthivî*, because it is smelled. There are as many elements as there are sense organs. This is an explicit tenet of the Sâṃkhya philosophy. And since, according to Indian view, man has five organs of sense and with each perceives a different element, there are, consequently, just five elements.

On the other hand, if Philolaos could have constructed six equilateral polyhedrons, he would have assumed six elements. Then, as a dodecahedron, our *holkas* together with other *holkads* in the *apeiron* would have been the fifth or *holkad*-element. And still other worlds would have had other forms of boundary and, accordingly, have constituted the sixth element.

Thus, the conformity of the number of sense organs with the number of equilateral polyhedrons is merely an accidental coincidence.

Strictly speaking, however, that conformity does not even exist. The Indians, namely, have five perceptible elements while the Pythagoreans, just like all of the Greeks, have only four perceptible elements. In addition, they have, as the fifth element, the invisible *holkas*. This is something perfectly unknown to the Indians. It would have been to them a sixth element if it could have been constructed into any of their systems. This, however, would not have been possible. The *holkas*, namely, does not correspond to the *âkâśa*. *Âkâśa* is a correspondence to the *apeiron* concerning extensiveness and filling with a certain something and, on the other hand, to the air concerning audibility, yet with the exclusion of tangibility. The *holkas* could not be the *âkâśa*, but at best only something *in* the *âkâśa*. Yet, the *holkas* could not even as a *perainon* be constructed, from outside as it were, into the *âkâśa*. For the *holkas* is a result of that geometrical atom construction. The *Sâṃkhya* system, however, (which here is pertinent primarily) operates, not with producing lines, but with the three *guṇa*'s of the *prakṛti* that are something utterly non-atomistic and non-geometrical (cf. Richard Garbe, *Die Sâṃkhya-Philosophie*, 1894, pp. 220 ff.).

There is still another difference between the Pythagoreans and the Sâṃkhyas. In the Sâṃkhya doctrine, the elements are telescoped into each other, while the Pythagorean polyhedrons completely exclude each other. *Âkâśa* alone is thoroughly pure, for it is only heard. *Vâyu* (air) contains already an admixture of *âkâśa* as it is not only felt, but also heard whistling. *Tejas* (fire) contains *âkâśa* and air since it is not only seen, but also heard crackling and felt hot. *Ap* (water) is heard, felt, seen, and tasted (it is smelled through earthy contamination only). *Pṛthivî* (earth) is heard, felt, seen, tasted, and smelled. That was the reason why the Sâṃkhyas have assumed as existing behind the perceptible coarse elements, or *sthûla-bhûta*'s, just as many fine elements, imperceptible to common man, the *sûkṣma-bhûta*'s, or *tanmâtra*'s, which alone were pure primary air, pure primary fire, etc. (cf. Garbe, *l.c.*, p. 236 ff).

No such distinction between coarse and fine elements of the same name is there with the Pythagoreans, for the simple reason that their elements just are not constructed with regard to the sense organs.

* * *

And What about Plato?

"Our discussion has shown that, when Plato forms the elements from the five regular bodies, he is independent of the Pythagorean elements doctrine. For such a doctrine (sc., of the Pythagoreans) has never existed, and those five regular bodies were discovered only in his (sc., Plato's) time." [1] And the negative result is "that the elements doctrine, as far as the employment of the regular bodies is concerned, is Plato's own creation and has nothing to do with the Pythagoreans." [2]

This rather bold, but perfectly legitimate conclusion by Eva Sachs from her (wrong) presupposition may now safely be discarded. The elements doctrine in Plato's *Timaeus*, from times immemorial considered Pythagorean, is indeed dependent on Pythagorean doctrine, of course.

Only, it cannot be used without ado as a source for our knowledge of the Pythagorean theory of elements. For in the *Timaeus* there are some embarrassing shortcomings of construction and also certain obvious deviations from the Pythagorean original. And the problem is whether those deviations are intentional alterations or – involuntary changes by a man who was not told everything and went astray when trying to find out by himself.

Plato has made a tremendous career, posthumously. I could not say when exactly he was elevated to the rank of the "divine" Plato. But it was, at any rate, already in later antiquity. And although since the thirteenth century A.D. Aristotle forcefully jumped to the forefront, there has never been any downgrading of Plato to the extent of cancelling his "divinity." Therefore, anything derogatory, anything not so divine, anything rather more "human, all too human," reported

[1] "Die vorausgehende Auseinandersetzung hat gezeigt, dass, wenn Platon die Elemente aus den fünf regulären Körpern bildet, er von der pythagoreischen Elementenlehre unabhängig ist, denn eine solche Lehre hat es nie gegeben, und die regulären Körper in ihrer Fünfzahl sind erst zu seiner Zeit entdeckt worden." (Eva Sachs, *l.c.*, p. 186.)

[2] "... dass die Elementenlehre, soweit die Verwendung der regulären Körper in Betracht kommt, Platons eigene Schöpfung ist und mit den Pythagorean nichts zu tun hat." (*l.c.*, p. 207.)

about Plato in some corner of ancient literature, is forthwith rejected by modern scholars as "malicious gossip" and "vicious fabrication."

In his own lifetime, however, and for quite a while afterwards, Plato was not yet the "divine" Plato. And we shall never get at historical truth until we stop fooling ourselves by closing our eyes to certain things.

Timaios of Tauromenion (350–255 B.C.), whom Zeller praises as an "authority of the first rank" ("*Gewährsmann ersten Ranges*") and calls the "greatest expert and most meticulous of all the historians of Sicily" ("*kundigsten und genauesten aller Geschichtsschreiber Siziliens*"), was born two years before Plato's death. No doubt he had the best opportunities of learning from first-hand sources what had happened in Sicily and Southern Italy during those three sojourns there of Plato.

We have quoted Timaios already in our presentations of Anaxagoras and Empedocles (cf. pp. 288 and 333). It is worthwhile quoting him again. Timaios has recorded (Diog. Laert. VIII 54) that Empedocles

> having been found guilty of theft of the doctrine, was at that time denied (further) participation in the lectures (just as Plato [sc., recently]).
>
> καταγνωσθεὶς ἐπὶ λογοκλοπίᾳ τότε (καθὰ καὶ Πλάτων) τῶν λόγων ἐκωλύθη μετέχειν.

This sober, unemphatic, short matter-of-fact statement in parenthesis does not sound at all like a slanderous fabrication.

A similarly dry parenthetical remark has been made, according to Diogenes Laertius, by Neanthes of Kyzikos who wrote about 300 B.C. After mentioning the excommunication of Empedocles, he adds that

> the same, he says, happened to Plato, for he, too, was expelled.
>
> (τὸ δ' αὐτὸ καὶ Πλάτωνα παθεῖν φησι· καὶ γὰρ τοῦτον κωλυθῆναι.)

Then there is a story to the effect that Plato, through Dion as his broker, bought the writings of Philolaos for the tremendous sum of 100 mines. Which by Timon of Phlius (320–230 B.C.) has been mocked at in those famous vitriolic verses:

> For quite a lot of money you bought a little booklet.
> This was your start in learning how to write the book *Timaeus*.
>
> Πολλῶν ἀργυρίων ὀλίγην ἠλλάξαο βίβλον,
> ἔνθεν ἀπαρχόμενος τιμαιογραφεῖν ἐδιδάχθης.

Gellius, Noct. Att. III 17; 44A8.

However all that may have been, it boils down to something like this: Plato, for similar reasons as Empedocles before him, must have been denied the permission to finish his Pythagorean studies. He may have tried to get in some other way what he had missed. But even so, even from some writing he might have acquired, he did not get the answers to some ultimate, fundamental questions. For the strict rule of secrecy – which to slight as allegedly a "pure legend arisen in later times" [1] is completely unjustified – was for very vital reasons still in force concerning certain fundamentals, even if the impoverished Philolaos was allowed to publish some parts of the doctrine to earn some money.

When reading the *Timaeus* carefully, one can virtually pinpoint what was kept top secret and what, therefore, though trying very hard, Plato could not find out by himself. It was: (1) the role of the production monad as the ultimate principle of all things and, as a consequence, the transformation into each other of *all* the four conditions of aggregation, or "elements"; and (2) the real meaning and function of the pentagondodecahedron.

With Philolaos, there is a perfectly clear basic idea. The clue is the equality of the edges and angles, and everything is ultimately reducible to the grammé (γραμμή), the self-turning line, the "power in the monad."

With Plato, however, the Demiurge makes two sorts of primordial triangles. Which is none too elegant, in the first place. Plato is forced to assume those two sorts since without the isosceles rectangular triangle he could not come to a square if, as he thought, the ultimate units must be triangles. And because he divides the square, as the surface plane of the cube, into triangles, he must then, of course, divide also the surface plane of the other three bodies, the equilateral triangle, into those six smaller rectangular triangles with the sides 1, 2, and $\sqrt{3}$.

Quite evidently, Plato thought planes were the ultimate units, those two sorts, namely, of rectangular triangles. He was admittedly not able to think of anything still more primordial and elementary:

> But what could be the principles still prior to these, God on high knows alone and of men he who may be dear to Him.
>
> τὰς δ' ἔτι τούτων ἀρχὰς ἄνωϑεν ϑεὸς οἶδε καὶ ἀνδρῶν ὃς ἂν ἐκείνῳ φίλος ᾖ.
>
> *Plato, Timaeus 53D.*

[1] as does Eva Sachs, misinterpreting a passage in Erwin Rohde's paper *Die Quellen des Jamblichus in seiner Biographie des Pythagoras* (1871).

That is to say, he himself does not know. He did not find out that to the Pythagoreans the ultimate element was the line and that, therefore, there was no need for them to assume those awkward two triangles.

In this way, however, the meaning proper of the Philolaos hypothesis was lost. The Pythagoreans had the most elegant manner of transforming anything from any form of aggregation into any other form, be it the solid, the liquid, the gaseous, or (at combustion) the tetrahedron form. Here, in an ingenious way, all the sorts of ultimate particles were transformed into each other.

Plato tries to imitate that. And he succeeds with the tetrahedron, the octahedron, and the icosahedron. But with the cube, he (erroneously [1]) came to believe, his method failed him. With resignation, he meekly confesses that here the way seems to be blocked:

> Thus, then, all (of them) are not capable of becoming a few big ones from many small ones, and inversely, by being dissolved into each other, but (merely) those three are capable of that.
>
> οὔκουν δυνατὰ πάντα εἰς ἄλληλα διαλυόμενα ἐκ πολλῶν σμικρῶν ὀλίγα μεγάλα καὶ τοὐναντίον γίγνεσϑαι, τὰ δὲ τρία οἷόν τε.
>
> *l.c.*, 54C.

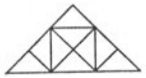
He is, accordingly, at a loss to know how to explain the thawing of the solid, the transition from ice to water, and inversely. That is also why Plato declares the fusible metals to be congealed liquids and gives them the form of icosahedrons, attributing the cube form only to such solids as cannot be melted, as for instance marble.

After having divided the square and the equilateral triangle, it should have been consistent for Plato to divide somehow also the surface plane of the dodecahedron, the pentagon. Here an isosceles triangle with angles of 54° at the basis would have been required.

Yet, neither of this triangle nor even of the pentagon and pentagondodecahedron is there any outspoken mention in the *Timaeus*. Plato merely says in one sentence at the end of a paragraph:

[1] Neither Plato nor his commentators have noticed that, as a matter of fact, also the cube could be transformed into the other three polyhedrons. By way of dissolving the cube into 24 triangles and then, but not isometrically, putting them together again, 15 cubes will yield 2 icosahedrons or 5 octahedrons or 10 tetrahedrons:

$$\frac{24 \times 15}{9} = 40$$



Since, however, there was still one more formation as the fifth, the god made use of it for the universe in decorating it (sc., the universe) with pictures.

ἔτι δὲ οὔσης ξυστάσεως μιᾶς πέμπτης, ἐπὶ τὸ πᾶν ὁ θεὸς αὐτῇ κατεχρήσατο ἐκεῖνο διαζωγραφῶν.
l.c., 55C.

Not even the word dodecahedron is there. How one could suggest that Plato may even have been himself the very first to add the dodecahedron to the other regular solids (cf. Raven, l.c., p. 155) it is very hard to understand.

The meaning and function of the pentagondodecahedron as the *holkas* of the world was of vital importance and must have been one of the greatest secrets of the doctrine. Best proof is the story about the death by drowning in the ocean of the Pythagorean Hippasos as divine punishment for his crime of writing about the dodecahedron (cf. Jamblichus, *Vita Pythagorae*, 18, 4).

Plato just did not know what to do with that fifth formation he had learned about.[1] And that "ball made of twelve pieces of leather" in the *Phaedo* (110 B) has merely served as a device for commentators, ancient and modern, to make an unsatisfactory attempt at finding out some possible Platonic use for the dodecahedron. In fact, however, Plato has no use for it, even. He does not need it. For what the *holkas* has to do is in the *Timaeus* a performance of the Demiurge. Hence that disproportion in Plato between the pentad of equilateral polyhedrons and the four actually needed elements.

There can be no doubt that Plato's elements doctrine conspicuously differs from the Pythagorean original. He must have been initiated to a certain extent only and then have made a wrong reconstruction of the rest. But can this really be all?

It may be that this explanation is correct, though, but does not answer all the questions. It does not seem credible that Plato should have deviated from Philolaos intentionally. But he made perhaps a virtue of necessity. The equilateral triangle, namely, could not very well serve Plato's purposes anyway. With the equality of its sides and angles, it would have been a democratic symbol, and what he needed

[1] So he even came to mention (*Timaeus* 55D) an alleged problem as to "whether one world or five worlds had come into existence," which is completely meaningless. Plato must have felt somewhat uneasy about it himself. For abruptly, with a "Let us forget about these things!," he proceeds to another topic. ("καὶ τούτων μὲν μεθετέον" κτλ. I read, with V, B, S, and T, τούτων, and do not accept the solitary P version τοῦτον.)

was rather something like a symbol of an hierarchically articulated trichotomy. For, ultimately, the whole *Timaeus* is meant to intimate the idea that, given the laws of nature, the *anankaion*, as subservient to the will of the Demiurge, the *theion*, the final result and coronation of cosmogony is the Platonic republic . . .

The Five Occurrence Elements

We continue quoting from Stöhr's reconstruction:

* * *

According to Pythagorean view, every element has a group of functions, and each its own ones. Hence, all occurrences in the world can be divided into five groups that correspond to the performances of the five elements. If, therefore, one knows how to break occurrences down into the ultimate partial occurrences, then all the occurrences in the world can be arranged in groups as strictly severed from each other as are the stuff elements. In this sense, the five groups of occurrences can also be called the five occurrence elements.

Now, a stuff element is a world element. For the world consists of things. An occurrence element is likewise a world element. For the world consists of occurrences, too. Consequently, one can say: *the five stuff elements and the five occurrence elements together are the ten world elements*. From this Ten, the whole world can be understood.

If we count the stuff elements as the first five world elements and then continue counting with the occurrence elements, the sixth world element will be the first occurrence element, the seventh world element, the second occurrence element, and so forth.

There has been handed down such an enumeration. But it is incomplete. It breaks off with the eighth world element, or third occurrence element. In the *Theologoumena arithm.*, p. 55 Ast (44A12) it says:

> But after (comprising) the mathematical dimension that moves apart in a threefold way (*i.e.*, the threedimensional stuffs) in the Four,[1] the quality and performance of the exhibited (whole) nature in the Five, *psychosis* in the Six, intellect and health and what he calls light in the Seven, after these Philolaos says that desire and love and prudence and judgment come to the beings on the basis of the Eight.

[1] In his list of the various Pythagorean sorts of *tetraktys* (*i.e.*, series of four), Theo of Smyrna (1st half 2nd cent. A.D.) mentions also the following:

> The fourth *tetraktys*, however, is that of the simple substances, fire, air, water, earth, which has an analogy to that concerning the numbers. For what is there the One, is here the fire; what (is there) the Two, (is here) the

Φιλόλαος δὲ μετὰ τὸ μαθηματικὸν μέγεθος τριχῇ διαστὰν <ἐν> τετράδι,[1] ποιότητα καὶ χρῶσιν[2] ἐπιδειξαμένης τῆς φύσεως ἐν πεντάδι, ψύχωσιν δὲ ἐν ἑξάδι, νοῦν δὲ καὶ ὑγείαν καὶ τὸ ὑπ' αὐτοῦ λεγόμενον φῶς ἐν ἑβδομάδι, μετὰ ταῦτά φησιν ἔρωτα καὶ φιλίαν καὶ μῆτιν καὶ ἐπίνοιαν ἐπ' ὀγδοάδι συμβῆναι τοῖς οὖσιν.

The threedimensional stuff, then, the "threefold mathematical dimension" of the (visible) elements, is enumerated under One to Four,[1] is comprised in the Four, or Tetras. Then follows the quality and performance (*chrosis*[2]) of the (invisible) fifth element, encompassing the whole exhibited nature. Next comes, sixth, the first occurrence element under the name of *psychosis*. As here *psychosis* is used in contrast to *nous* (intellect) and *eros* (desire), there is left for *psychosis*, and *psycha* respectively, as far as this passage is concerned, only the meaning of sense perception (*aisthesis*) and unconscious physiological functions, such as breathing and blood movement.

Let us now see whether there is any connection between the first occurrence element, *psycha*, and the first stuff element, fire; between the second occurrence element and the second stuff element; and, finally, between the third occurrence element and the third stuff element.

Psychosis means, in the first place, "bestowal of *psycha*," and the primary meaning of this word is "breath." Breath is connected with life-warmth, and this, in turn, is the *fire* element itself in adequate dilution. Life-warmth has also something to do with blood movement. On the whole, any self-movement is due to the eternal self-movement of the fire element, ultimately, be it in the system of the celestial bodies or in the system of the organisms.

By *psycha*, therefore, one has to understand not the air exhaled, but the movement of breathing, and not the blood itself, but the movement of the blood by the heart. Nutrition and digestion do not belong to *psycha* because here there is no self-movement. (The whole complex of the physiological movements of nutrition, namely, was not yet taken into consideration in antiquity.)

air; what (is there) the Three, (is here) the water; what (is there) the Four, (is here) the earth.

τετάρτη δὲ τετρακτύς ἐστι τῶν ἁπλῶν <σωμάτων>, πυρὸς ἀέρος ὕδατος γῆς, ἀναλογίαν ἔχουσα τὴν κατὰ τοὺς ἀριθμούς. ὅπερ γὰρ ἐν ἐκείνῃ μονάς, ἐν ταύτῃ πῦρ· ὁ δὲ δυάς, ἀήρ· ὁ δὲ τριάς, ὕδωρ· ὁ δὲ τετράς, γῆ·

Theo Smyrnaeus (Hiller) 96, 18.

[1] See note page 473.

[2] To render here χρῶσις as "coloring" would be completely meaningless. In this late report, the term χρῶσις might indeed be a literal quotation from the Philolaos original (which could not be said of ποιότης, of course, as already Erich Frank has pointed out (*l.c.*, p. 318). Stöhr is obviously right in understanding χρῶσις as "performance," "function," that is to say, in deriving it from χράομαι, "to make use," "to employ," "to perform." Cf. also χρεία, "business," "employment," "function," "use," and χρέος, "duty," "task," "charge," "office."

On the other hand, however, every sensation is connected with automotion, and every automotion is accompanied by sensation, according to pyrozoistic as well as panzoistic view. Hence, also sense perception is tied to life-warmth.

If, then, we set aside the celestial bodies and restrict ourselves to the performances in the organisms, the following phenomena appear to be comprised under the term *psycha* as the performances of the fire: the movement of breathing, blood movement, self-movement of the body from the spot, and sensation. In another passage (Theolog. arithm. p. 20, 35 Ast [44B13] cf. p. 476) the involuntary and voluntary movements, as *psycha*, are contrasted to sensation, as *aisthesis*.

If we follow up this idea, then intellect (*nous*), health (*hygeia*), and light (*phos*), as the seventh world element and second occurrence element, appear to be in coordination to the second stuff element, the *air:*

Marsh air makes sick, in pure air *health* is preserved.

Light belongs here because, according to Pythagorean view, it is not fire, but air that gives light. Fire is only hot. The shining of the fire comes from the surrounding air set into vehement motion by the fire. Left to itself, air cannot give light because any self-movement stems from fire. Lustre and light in themselves are cold. If, therefore, the air movement away from a fire is transmitted over a great distance, a remote object can shine and sparkle without being hot (as, for instance, the point of a lance sparkling in the sun).

Activity of the *intellect*, in contradistinction to sense perception, is likewise a performance of the air. This activity is tied to the brain, according to Philolaos (44B13). The brain is supplied partly with blood, partly with air. One must not forget that the veins of killed animals are void of blood and, found to be bloodless, were in antiquity treated not as blood vessels but air vessels. Accordingly, one has to distinguish between two ostensible counter-processes: By the supplying to the brain of arterial blood, the emotions come about; by the supplying of air, simultaneously with a decrease of blood supply, calm thinking arises. Hence, cool thinking is a performance of the air; emotion, a performance of the blood.

Entirely without blood, though, there is no thinking, either. The same way as the air must be intensively moved by fire at short distance if it is to give light, also the air in the brain must be set into motion by the warm blood if it is to think. The blood, in turn, does not warm by its own power, but through the fire element contained in it. If, however, so much blood is supplied that the air is displaced, then calm thinking ceases.

From this juxtaposition of health, thinking, and shining, it becomes imperative to draw a strict distinction in Pythagorean phraseology between *pyr* and *phos*. The phenomenon of light is tied to the air in motion, and not to the tetrahedron element that is briefly called *pyr*.

The fire element is not self-luminous. It is, by its dark self-movement, or dark heat, merely the indispensable cause of the shining of the air. The movement of shining, on the other hand, has first to be transmitted to the air. Likewise, thinking is due, not to the fire element, but to the air in the brain. Yet, the air must to a certain degree be moved by the fire element (*i.e.*, life-warmth) if there is to be any thinking. It does not seem to be advisable, therefore, to translate the Pythagorean *pyr* as "fire." For we are used to think of a shining fire. For this reason, it will be more appropriate to translate *pyr*, in Pythagorean usage, not as "fire element," but as "heat-stuff" or "warmth-stuff."

The eighth world element and third occurrence element is desire (*eros*), love (*philia*), prudence (*metis*), and judgment (*epinoia*).

Emotions and excitements are tied to the blood, that is to say, that ingredient of the body in which the liquid element, or *water*, prevails.

To the performances of the liquid element belong also prudence and judgment. Both are only possible because we love or hate something, desire or eschew something. It is desire and love that are setting the ends which then intelligence, aimless in itself, will serve.

This enumeration of the occurrence elements is obviously incomplete. If there is to be any perceiving, thinking, and loving, there must be, at least here below, an organism. Breathing and blood movement are only the working-functions of an organism already formed. There is still lacking a principle by which the organisms are built up from the particles of the elements.

The fourth occurrence element, at least, can be gathered from another enumeration. Philolaos gives a list of the central organs. (His term for "central organ" is likewise "principle," or *archa*.) In Theolog. arithm. p. 20, 35 Ast (44B13) it says:

> And there are four principles of the rational animal, as also Philolaos says in his book On Nature: brain, heart, navel, genitals. The brain (is the principle) of the intellect; the heart, of psyche (*i.e.*, the physiological self-movements) and sense perception; the navel, of taking root and of development of the embryo; the genitals, of sperm emission as well as procreation (or birth). The brain signifies man's principle; the heart, that of the animal; the navel, that of the plant; the genitals, that of them all; for all both blow and grow.
>
> καὶ τέσσαρες ἀρχαὶ τοῦ ζῴου τοῦ λογικοῦ, ὥσπερ καὶ Φιλόλαος ἐν τῷ Περὶ φύσεως λέγει, ἐγκέφαλος, καρδία, ὀμφαλός, αἰδοῖον. ἐγκέφαλος μὲν νόου, καρδία δὲ ψυχῆς καὶ αἰσθήσιος, ὀμφαλὸς δὲ ῥιζώσιος καὶ ἀναφύσιος τοῦ πρώτου, αἰδοῖον δὲ σπέρματος καταβολᾶς τε καὶ γεννήσιος. ἐγκέφαλος δὲ <σαμαίνει> τὰν ἀνθρώπου ἀρχάν, καρδία δὲ τὰν ζῴου, ὀμφαλὸς δὲ τὰν φυτοῦ, αἰδοῖον δὲ τὰν ξυμπάντων· πάντα γὰρ καὶ θάλλουσι καὶ βλαστάνουσιν.

Here the central organs are enumerated merely in accordance with anatomical arrangement and without regard to the sequence of the elements. In the brain prevails the performance of the air, cold, clear thinking. This is characteristic of man. In the heart, the function of diluted heat, or life-warmth, is predominant. Therefore, the heart is the central organ for the conscious and unconscious physiological self-movements, such as those of breathing and of the blood, both together covered by the term *psycha*, while sense perception, dependent thereon, is called *aisthesis*. These are the functions man has in common with animal. And by these functions, animal is distinguished from plant.

The navel is the central organ for the development of the embryo, hence for growth, self-nutrition, and self-formation in general. In the plant, the navel is found as that spot of the seed where the tip of the root breaks through and radication takes place. Nutrition and growth are common to plant, animal, and man. With all these, for origination, self-formation, and nutrition the earth element is needed. Also, all of them return to earth. Therefore, this performance is coordinated to the *earth* element. It is, consequently, the ninth in the order of world elements and the fourth in the order of occurrence elements.

At the end of the list of the central organs are the genitals. These are found in plant, animal, and man, in other words, in all that consists of earth and returns to earth. The sex function, accordingly, will likewise be coordinated to the earth. Both functions are substantially inseparable from each other. Without growth and self-nutrition, there is no subsequent procreation, and without procreation, no subsequent growth.

What is true of procreation applies also to agamic generation by gemmation and fission. But in this passage, agamic generation is not mentioned because no special organs are needed for it. Here, however the organs are enumerated, not the functions.

That is also why no organ for desire (*eros*) and love (*philia*), that is to say, no organ for emotional reaction is mentioned. According to Pythagorean view, namely, this reaction has no central organ because it is tied to the blood. Thus, it is, as already said, the eighth in the order of the world elements and the third in the order of the occurrence elements. In blood prevails water.

And what is the performance of the fifth element?

The function of the *fifth element* follows quite obviously from the size of the *holkas* and its situation in the *apeiron:*

The *holkas* is the guardian of our world. It keeps the first four elements together, forcing them to form the world. Without the *holkas*, the particles of the elements at the surface of the world would dissipate into the *apeiron* outside.

According to Pythagorean view (*i.e.*, Philolaos), namely, the star heaven is turning around a world axis. We, on our earth, are turning around the same world axis. Hence, what is revolution time for our earth is rotation time for the star heaven. Therefore, as one rotation of the star heaven exactly corresponds to one revolution of our earth around the Central Body, we see the fixed stars as seemingly unmoved. Now, it takes our earth only one day and one night for one revolution. For the particles of the celestial vault, consequently, that means an extremely great velocity. This vault, namely, is not a solid body, but a gaseous spherical stratum in which the single tetrahedrons are revolving in complete isolation from each other. That is why these particles would be liable to leave our world by centrifugal force, were it not for the *holkas* that renders such flight impossible.

Why Is the 'Soul' a 'Harmony'?

Thus, in the *world*, taken as a whole, there are *five* stuff elements in *ten* world elements, or the proportion 1:2. Such proportion is called an octave, or *harmonia* (ἁρμονία). A later term is *dià pasôn* (διὰ πασῶν). This *world harmony* contains also all the other musical proportions, such as 2:3, 3:4, etc.

In the living *man*, there are *four* stuff elements in *eight* world elements. This, too, is a proportion of octave, or *harmonia*, or 1:2, and likewise also other musical proportions are contained in it. Therefore, also the living human being can be called a harmony.

In *animal*, there are also *four* stuff elements. But the seventh element, as activity of the intellect, is ineffectual. Here the seventh element manifests itself only in the form of health. Hence, there is here *no full harmony* any more.

Macrobius (*Somn. Scip.* I 14, 19; 44A23) says that Pythagoras and Philolaos have called the soul a harmony (*Pythagoras et Philolaus harmoniam* sc., *animam esse dixerunt*). Cf. also Plato, *Phaedo* 85E ff., Aristotle, *De anima* I 4. 407b27 ff., and *Polit.* VIII 5. 1340b18 (58B41).

The Admiration for the Number Ten

In this attempt at reconstruction, one cannot do quite without neo-Pythagorean reports. But, considering that the revivers of Pythagoreanism had an inclination to ascribing as much as possible to Pythagoras and his first disciples, great caution and reserve is here required. At any rate, inner probability should have a voice in this matter.

And psychologically probable it is indeed that the Pythagoreans of old, after having found the five elements in that geometrical way of production, were looking for five functions of those five elements and so came to admire the number Ten. Had they been able to construct six regular polyhedrons, they would have sought six corresponding functions and, accordingly, there would have been no reason for any interest in the Ten.

Their admiration of the number Ten must have been also psychologically motivated. The number of the world elements must have been discovered independently of the number of our fingers and yet coincide with it. Only in this way is an amazement at such conformity possible, and an idea might dawn that Nature is working in accordance with the number Ten.

It is highly probable that already in those olden times the non-Pythagoreans among the Greek, on the basis of their own non-Pythagorean way of thinking, made up a wrong reconstruction of the general Pythagorean doctrine from single, disconnected Pythagorean sentences and phrases. They may have underestimated the sagacity of the Pythagoreans and overestimated their symbolism. It could very well be that the early Pythagoreans never mistook number for the essence of things, but merely treated the numerically describable side of things as the only searchable side and regarded all the concomitant phenomena, such as tones, colors, heat, as "correspondences" which they just called "copies" (μιμήσεις) and "images" (ὁμοιώματα).

THE STRUCTURE OF THE WORLD

According to Philolaos, the world sphere is divided into a smaller inner sphere and two spherical strata. In Aetios II 7, 7 (44A16) we read:

> Philolaos (assumes) a *pyr* in the middle around the centre which he calls "hearth of the universe" and "castle of Zeus" and "mother of gods" and "domestic altar as well as crossroads and destination of nature." And again (he teaches) another *pyr* on highest, the enclosing one. (He says) that the first by nature is the one in the middle, but that around this ten divine bodies are dancing: the Olympos and the five planets,[1] after them the sun, below which the moon, below which the earth, below which the counter-earth, inmidst all of which (there is) the *pyr* of the hearth, maintaining the order around the centre-parts. The uppermost part of the *periechon* (i.e., the "enclosing") in which (he says) there is the dissociation of the ultimate particles,[2] he calls Olympos; that (part),[3] however, below the movement of the Olympos where (he says) the five planets with the sun and the moon have their places, (he calls)

[1] Deviating from Stöhr who had still the completion <μετὰ τὴν τῶν ἀπλανῶν σφαῖραν>, I make use of Heinrich Gomperz' much more satisfactory completion <''Ολυμπόν τε καὶ τοὺς πέν>τε πλανήτας.

[2] The plural στοιχεῖα means here "simplest ingredients," "ultimate particles," not "elements," since in the Olympos there are particles of only one "element," namely, *pyr*.

[3] It must, of course, read τό (sc., μέρος), not τά, for ἐν ᾧ does not refer to ὀλύμπου, but to μέρος.

Cosmos; but the sublunar and circumterranean part below these – that part in which there are the (things) of change-loving Becoming – (he calls) Uranos.

Φιλόλαος πῦρ ἐν μέσῳ περὶ τὸ κέντρον ὅπερ ἑστίαν τοῦ παντὸς καλεῖ καὶ Διὸς οἶκον καὶ μητέρα θεῶν βωμόν τε καὶ συνοχὴν καὶ μέτρον φύσεως. καὶ πάλιν πῦρ ἕτερον ἀνωτάτω τὸ περιέχον. πρῶτον δ' εἶναι φύσει τὸ μέσον, περὶ δὲ τοῦτο δέκα σώματα θεῖα χορεύειν, <"Ολυμπόν τε καὶ τοὺς πέν>τε πλανήτας,[1] μεθ' οὓς ἥλιον, ὑφ' ᾧ σελήνην, ὑφ' ᾗ τὴν γῆν, ὑφ' ᾗ τὴν ἀντίχθονα, μεθ' ἃ σύμπαντα τὸ πῦρ ἑστίας περὶ τὰ κέντρα τάξιν ἐπέχον. τὸ μὲν οὖν ἀνωτάτω μέρος τοῦ περιέχοντος, ἐν ᾧ τὴν εἰλικρίνειαν εἶναι τῶν στοιχείων,[2] ὄλυμπον καλεῖ, τὸ [3] δὲ ὑπὸ τὴν τοῦ ὀλύμπου φοράν, ἐν ᾧ τοὺς πέντε πλανήτας μεθ' ἡλίου καὶ σελήνης τετάχθαι, κόσμον, τὸ δ' ὑπὸ τούτοις ὑποσέληνόν τε καὶ περίγειον μέρος, ἐν ᾧ τὰ τῆς φιλομεταβόλου γενέσεως, οὐρανόν.

Uranos, Cosmos, Olympos

The smaller spherical space, then, in the middle of the universe contains the *pyr hestias* (πῦρ ἑστίας), or "heatstuff of the hearth," the earth, and the counter-earth. Its name is *Uranos*, the sublunar region, or *hyposélenon meros* (ὑποσέληνον μέρος), the *earth-heaven*, so to speak.

The adjacent sphere stratum contains the moon, the sun, and the five planets known in antiquity.[4] It is called *Cosmos* and can be subdivided into the stratum for the moon, or *moon-heaven*, and the next higher stratum for the sun and the planets, or *sun-heaven*.

The outermost sphere stratum contains only *pyr*. Where that *pyr* is very dense, there is a glittering of the bordering air of the adjacent Cosmos, and such a glittering spot appears as a star. This sphere stratum consisting only of uppermost *pyr*, *pyr anotáto* (πῦρ ἀνωτάτω), or *pyr peri-échon* (πῦρ περιέχον), is called *Olympos*.[5]

The Olympos is not a sum of celestial bodies, or stars, but only one "divine body," or *soma theion* (σῶμα θεῖον). "Divine" means here just "astronomical," or "celestial."

The treatment of this stratum as one body is a logical consequence of the distinction between *pyr* (heat) and *phos* (light). *Pyr* gives no light by itself. It is merely hot. The lighting is a performance of air set into intensive vibration by *pyr*. The glittering stars, therefore, do not belong

[1], [2] and [3] See note 1, 2 and 3 page 479.

[4] They are: Mercury, Venus, Mars, Jupiter, and Saturn. Those discovered only in modern times are: Uranus (1781), Neptune (1846), and Pluto (1930).

[5] This Pythagorean terminology is quite different from the usual one. Commonly, Uranos is a term for the surface of the world sphere, the star-heaven, while Cosmos means the interior, the contents of the world sphere, as, *e.g.*, with Anaximander. With the Pythagoreans, however, it is just the opposite: here Uranos is the innermost sphere, and Cosmos is a spherical stratum around it, the moon-heaven and sun-heaven.

to the Olympos itself. They belong already to the Cosmos, to the outermost, air-containing stratum of the Cosmos that borders on the dark, but hot Olympos.

In the Olympos itself, there are only isolated tetrahedrons, or atoms of the heat-stuff, all of them revolving around the world axis. Where these atoms are very numerous in the space unit, there the Olympos is very hot and, as a consequence, the Cosmos border below glitters as a star. Accordingly, it would not be quite appropriate to call the Olympos "star-heaven." A better expression would be "*star-mantle*."

In that star-mantle, there is a complete isolation (*heilikrineia* [εἰλικρίνεια], "unconnectedness," "severedness," "dissipation") of the ultimate particles (στοιχεῖα) of the heat- or warmth-stuff that consists only of tetrahedrons. Hence, no organism is possible there any more since there is there neither any aggregation nor heterogeneity of particles. There are merely certain spots where particles are closer together, viz. above the gleaming points we call stars, and other places where those particles are scarce within the space unit and where, therefore, the adjacent air stratum of the Cosmos does not shine. These differences in density are not levelled down since all those particles are revolving with equal velocity, and so the stars remain preserved.

When seen from a point outside the *holkas*, the Olympos would be dark. To us, however, it appears as a dark mantle spangled with stars and, by day, as a blue vault.

At any rate, the Olympos is one "divine body." It resembles the central "Pyr of the Hearth" in so far as this, too, consists of tetrahedrons alone without admixture of any other element.

The term *pyr hestias* (πῦρ ἑστίας), the *pyr* of the hearth, or, without allegory, *pyr en to kentro* (πῦρ ἐν τῷ κέντρῳ), the pyr in the centre (of the world), has to be cautiously translated. As already mentioned, the Pythagoreans distinguish on principle between *pyr* and *phos*, whereas when using the expression "fire," we are thinking of self-shining fire and gas. Therefore, translation as "central fire" would not be adequate. Heat and warmth are coordinated to the tetrahedron, but light to the octahedron, or air. The *pyr hestias*, consequently, has to be understood as *something dark and hot* that is not shining by itself, but makes the adjacent air shine.

There is still another difficulty concerning translation of *pyr hestias*. It is not at all a matter of course that the "castle of Zeus" must be of a gaseous state of aggregation. The tetrahedrons, too, can form a solid aggregate, just like the cubes of the earth element. Then we should have to surmise perhaps, as the genuine Pythagorean opinion, not a fiery sphere of gas in the middle of the world, but a hot central *body:*

It is certainly somewhat unnatural to suppose that gases formed of tetrahedrons should be in the middle as well as in the border stratum of the world, and dense and exclusive in the middle, sporadically dense and again exclusive in the border stratum, while these tetrahedrons would be relatively scarce in the space between. One would rather expect either that the tetrahedrons spread uniformly everywhere – as a

consequence, the "heat-stuff of the hearth" would be transformed into a uniform world-warmth, and the source of light in the world, the source of the shining air motion that is, would be extinguished – or that the tetrahedrons, as the lightest corpuscles, would gather in the Olympos exclusively. But that, instead, the same tetrahedrons should gather below and above, and not in between, and that there on high they should be only sporadic – this, strictly speaking, is quite absurd.

If, however, we assume that there are also tetrahedron aggregates, then it is consistent to locate the heat-stuff gas, or isolated tetrahedrons, as the lightest thing, in the star-mantle and let the tetrahedron aggregate, or heat-stuff solid, as the heaviest, sink down into the centre of the world as the "heatstuff of the hearth," the *pyr hestias*. The earth, namely, taken as a celestial body (which here is to be realized as a disk, not as a ball), can be specifically lighter than the hot Central Body, provided only that the earth have sufficiently numerous and large caves beneath our soil.

Only this conception of a dark fire-body, or heatstuff-solid, makes sense physically, considering the primitive notions of those times.[1]

The Organisms on the Moon

In the opinion of Philolaos and some other Pythagoreans, the moon is supposed to be inhabited. The tenets about inhabitants of the moon offer a welcome opportunity for testing the coordination of the occurrence elements to the stuff elements.

There is the following report in Aetios II 30, 1 (44A20):

> Some of the Pythagoreans among whom is Philolaos (say) that the moon appears earthlike because it is, just like the earth with us, inhabited all over by animals and plants that are bigger and more beautiful: For the animals on it (they say) are fifteen times as strong (as those on earth), not eliminating any excrement, and their day is in length of the same extension (*i.e.*, likewise fifteen times as long).
>
> τῶν Πυθαγορείων τινὲς μέν, ὧν ἐστι Φιλόλαος, γεώδη φαίνεσθαι τὴν σελήνην διὰ τὸ περιοικεῖσθαι αὐτὴν καθάπερ τὴν παρ' ἡμῖν γῆν ζῴοις καὶ φυτοῖς μείζοσι καὶ καλλίοσιν· εἶναι γὰρ πεντεκαιδεκαπλάσια τὰ ἐπ' αὐτῆς ζῷα τῇ δυνάμει, μηδὲν περιττωματικὸν ἀποκρίνοντα, καὶ τὴν ἡμέραν τοσαύτην τῷ μήκει.

[1] Incidentally, the hot Central Body must be dark because otherwise the light emitted by it would have to be present everywhere. The Olympos would have to be continually shining, there would have to be daylight all of the time. For the earth is throwing merely a shadow. Or else if we keep in mind that shadow the earth is throwing, then there would have to be always night. At least, however, there would have to be a solar eclipse every day. This was evidently one of the main reasons why the Central Body had to be dark, and why the Pythagoreans had to draw a distinction between heat (*pyr*) and light (*phos*).

At a first glance, the word "earthlike" could be taken in a material sense, then also in the sense of "containing earth," as, for instance, sea-water is called γεῶδες (*geodes*), "earth-containing," in Aristotle (762a28). But here none of the usual meanings applies. For immediately the explanation is given that the moon is earthlike *insofar as* it is likewise inhabited by animals and plants.

True, the moon could nevertheless additionally be "earthlike" also insofar as it might perhaps contain the earth element. For without it plants and animal beings such as we know cannot exist.

However, it is added forthwith that these animal beings and plants are of an entirely different kind. They are much bigger and much more beautiful than those here below and do not eliminate any excrements. Consequently, they have no digestion and, therefore, no nutrition with earthly food, either. Why so if the moon is "earth-containing," or "earthlike"? The answer is: the moon just does not contain any earth. It is earthlike only "by its being inhabited," διὰ τὸ περιοικεῖσθαι.

There is no such food there as could be digested. Those organisms live on diluted heatstuff (*pyr*), air, and watery vapor. That is what the passage in Aetios II 5, 3 (44A18) refers to:

> The evaporations of these (sc., of heat, water, and air) are the foodstuffs (they say) of the Cosmos.
>
> τούτων (sc., πυρός, ὕδατος καὶ ἀέρος) εἶναι τὰς ἀναθυμιάσεις τροφὰς τοῦ κόσμου.

The Cosmos itself, the moon-and-sun-world-space, does not need any food, does it? "Cosmic food," in contradistinction to "earthly food," means food for organisms in the Cosmos, for the inhabitants of the moon that is, in contrast to food for the organisms in the Uranos, or terrestrial plants, animals, and men.

This, in turn, implies that the inhabitants of the moon have no earth element in themselves, either, since otherwise they would need earth-containing food.

There is no mention of how those organisms propagate. But since they require cosmic food, they will also grow, and as they grow, they will multiply, too, yet in a different manner from the earthly organisms, the propagation of which is tied to the earth element.[1]

Incidentally, here is an opportunity for calling attention to the plural "evaporations" (ἀναθυμιάσεις [*anathymiaseis*]):

The water of the rivers and the sea has an evaporation: the water

[1] In this connection, it is interesting to see that even Aristotle was far from knowing exactly and understanding what the Pythagoreans taught when (in *De sens.* 5. 445a16; 58 B 43) he says:

> What some of the Pythagoreans say does not make sense: they say, namely, that some animals live on smells.
>
> ὃ δὲ λέγουσί τινες τῶν Πυθαγορείων, οὐκ ἔστιν εὔλογον· τρέφεσθαι γάρ φασιν ἔνια ζῷα ταῖς ὀσμαῖς.

contents of the air that becomes condensed to fog and clouds and, as rain, returns to liquidity. But what is supposed to be the meaning of an "evaporation of heat" and an "evaporation of air" unless there is a liquid or a solid aggregate to be volatilized or vaporized or gassified?

This indicates that the Pythagoreans did assume also an aggregate of tetrahedrons, a *heatstuff-solid*, and an aggregate of octahedrons, an *air-solid*, the evaporations of which are gaseous heatstuff and gaseous airstuff.

We have already pointed out that probably the *pyr hestias*, the "heatstuff of the hearth," means a hot central body, a solid tetrahedron aggregate, and not a hot central gas-sphere. In analogy to the ocean, the clouds, and the rain, this central body could emit isolated tetrahedrons, gaseiform heatstuff, a so-called *pyr* evaporation (ἀναθυμίασις πυρός), that later on, as heatstuff precipitation, would return to the hot central body.

A rarefied heatstuff evaporation spreading as far as the inhabitants of the moon can serve them as food.

The expression "evaporation of air" (ἀναθυμίασις ἀέρος) shows that also an octahedron aggregate has been assumed to be somewhere: an air-solid that emits air and upon which air is condensed back again. This solid body seems to have been the *sun*. Thus each element would have had not only its gas, but its solids and fluids as well.

There is still another point indicating that aggregates of tetrahedrons, octahedrons, and icosahedrons have been assumed. Could the inhabitants of the moon have been called animals and plants if no definite shapes, inner frames, and integuments had been ascribed to them? They certainly did have all these. But the body frames and everything else of a more solid formation just consisted not of the earth element, not of cubes, but of icosahedrons, octahedrons, and tetrahedrons.

For organisms such as these the air of our earth is much too hot and dry. That is also why it says in Aetios II 5, 3 (44A18) that there is a danger of a

> destruction of the Cosmos ... from heatstuff of the Uranos streaming in ... owing to the circular movement of the air spilt.
>
> φθορὰ τοῦ κόσμου ... ἐξ οὐρανοῦ πυρὸς ῥυέντος ... περιστροφῇ τοῦ ἀέρος ἀποχυθέντος.

Not the Cosmos itself is in danger of destruction, but life in the Cosmos is, life in the moon-space, if the revolving dry and hot air of the Uranos, or earth-heaven, in its circular movement around the world axis should go up higher some day and penetrate into the moon-world-space. In this case, the lunar beings would have to melt, shrivel, dry up, pine away.

Another reason why the moon cannot contain earth or consist of earth is that otherwise it would be bound to have approximately the same specific gravity as our earth and to fall forthwith down into the

Uranos, the earth-heaven, upon us or beside us. The moon has the specific gravity of its surroundings in the moon-world-space. These surroundings consist of rarefied air, gassified heatstuff (*pyr*), and gassified water element, but no earth element. The moon itself will consist of the same three elements, but will just have a solid aggregation. And since such solid aggregate would have to sink down in its gaseous surroundings, the Pythagoreans will of necessity have imagined the moon as a balancing *hollow* ball.

The gaseiform, transparent filling of the moon-heaven, or moon-world-space, in contradistinction to the moon itself, was probably that which was called the "lunary water" (ὕδωρ σεληνιακόν, *hydor seleniakon*) because the water particles in it were relatively more numerous than the air particles and the heatstuff particles.

The Sun And Its Inhabitants

Concerning the habitability of the sun, there is an enigmatic dictum the meaning of which becomes clear only if the nature of the sun is realized in a Pythagorean way.

According to Philolaos, the sun is not a self-luminous body, but merely a body reflecting, like glass, into the Uranos upon our earth the light and heat in the Cosmos:

Light is emitted by the hot Central Body in all directions and hence also upon the "glasslike" sun. Light means here the air movement, produced where the hot Central Body borders on the Uranos-air and spread by radiation.

Heat, on the other hand, is an evaporation, or *anathymiasis*, of the hot Central Body, from the surface of which single tetrahedrons rise as a vapor the same way as water particles evaporate from the surface of the sea. Just as those water particles return into the ocean in the circular course of the water, so the tetrahedrons return as a tetrahedron-rain into the Central Body in the circular course of the heatstuff. Such heat evaporations, too, can be reflected by the sun.

The sun is neither hot nor luminous by itself. Without irradiation, it has the temperature of its surroundings in the sun-heaven. It has also the specific gravity of its surroundings. For otherwise it would fall down. Being higher up than the moon, the sun will also be lighter than the moon. And since the moon is built of heatstuff, air, and water, but without earth, the sun, in turn, will lack not only earth, but also water. For only in this way can it be lighter.

The sun, nevertheless, is a solid body. It is compared to a mirror. The solidity of this mirror can only be accounted for by apposition to each other of octahedrons and tetrahedrons. A too great admixture of tetrahedrons would give the sun body a heat of its own that has not been ascribed to it. But a small admixture, resulting merely in some warmth of its own, might indeed have been assumed, probably. For then the sun, as a celestial body with two elements, formed a nice sequence with the moon, as a celestial body with three elements, and the earth, as one with four elements. And since in the air and the

gassified heatstuff a solid sun body would have to fall down, the sun, too, will presumably have been thought of as a *hollow* body: a glass-like, reflecting hollow *air-body*.

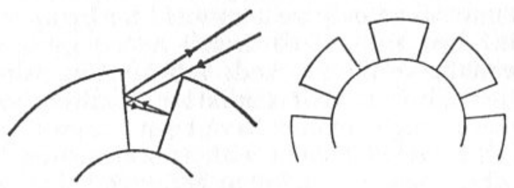
According to Aetios II 20, 12 (44A19),

> Philolaos the Pythagorean (teaches) that the sun is glasslike, receiving the reflection of the heatstuff which is in the Cosmos, but sieving through to us the light as well as the warmth, so that two suns come about, as it were: that fiery thing in the Uranos and that which looks like fire (stemming) from it by way of that mirror-like (reflection), unless somebody will even call a third (sun) the resplendence strewn to us from the interior of the mirror by way of refraction. For this (resplendence), too, we call a sun: an image's image, so to speak.
>
> Φιλόλαος ὁ Πυθαγόρειος ὑαλοειδῆ τὸν ἥλιον, δεχόμενον μὲν τοῦ ἐν τῷ κόσμῳ πυρὸς τὴν ἀνταύγειαν, διηθοῦντα δὲ πρὸς ἡμᾶς τό τε φῶς καὶ τὴν ἀλέαν, ὥστε τρόπον τινὰ διττοὺς ἡλίους γίνεσθαι, τό τε ἐν τῷ οὐρανῷ πυρῶδες καὶ τὸ ἀπ' αὐτοῦ πυροειδὲς κατὰ τὸ ἐσοπτροειδές, εἰ μή τις καὶ τρίτον λέξει τὴν ἀπὸ τοῦ ἐνόπτρου κατ' ἀνάκλασιν διασπειρομένην πρὸς ἡμᾶς αὐγήν· καὶ γὰρ ταύτην προσονομάζομεν ἥλιον οἱονεὶ εἴδωλον εἰδώλου.

The expression "to sieve through" in this passage requires a special explanation. It implies that the sun is supposed to have a sievelike surface, and that the tetrahedron and octahedron streamlets (*alea* and *phos*) come down to us from the holes. How does this agree with the comparison with a reflecting mirror? Who would perforate a mirror, thus only diminishing the reflecting surface?

One can find the solution of the riddle when keeping in mind that Philolaos was in a dilemma: If by day the earth is between the hot Central body and the sun, there is a solar eclipse every day. True, if the earth is taken as very small in proportion to the Central Body, the irradiation of the sun is not hindered any more. But there is still not much achieved by that. For the earth is supposed to cast on the sun no shadow at all; the irradiation of the sun shall be reflected upon the earth.

The Pythagorean train of thought was probably as follows:



The surface of the sun is perforated like a sieve. The tetrahedrons and octahedrons, coming in from all directions, are reflected, and refracted to and fro, within the glasslike, mirroring sun-crust until they finally come out again through a sieve-hole. From each sieve-hole, the issue takes place within a system of radiating lines, the *centre-ray* of which is a *sun-radius*. With this mechanism, the direction of entry is perfectly irrelevant. Hence, there is no daily solar eclipse, and the sun irradiates our earth like a sieve out of which heat rays and light rays purl down. The ability to reflect is important not for the external surface of the sieve, but for the closed inner bottom of the sun-crust and for the canals in which the tetrahedrons and octahedrons are tossed to and fro.

Into the interior of the sun, however, nothing will penetrate since the bottom of the crust is closed. As already mentioned, the sun must be a hollow body to keep its specific gravity equal with that of its surroundings since otherwise the sun would sink down.

Once one has taught the moon is inhabited by three elements organisms which, as a consequence of their consisting of three elements, cannot have any excrements, one can safely go a step farther and say the sun as built of two elements is inhabited by two elements organisms consisting of air and heatstuff. Their solid body frames and their skins will result from an aggregation of octahedrons and tetrahedrons, just as terrestrial organisms owe that solidity to the earth element in combination with the other elements.

The inhabitants of the sun will have clear intelligence, corresponding to the air, but no emotions since they have no blood. Their organ of thinking will be warmed up not by blood, but by the Central Body irradiating the sun. They will have respiratory movement, but no blood movement.

The Alleged Destruction of the World

In all probability, Philolaos did carry his doctrine to its consistent conclusion by having also the sun be inhabited. At any rate, it is only on the basis of this assumption that the following mysterious passage in Aetios II 5, 3 (44A18) can be understood:

> According to Philolaos, the destruction of the Cosmos is twofold: the one, from heatstuff of the Uranos streaming in, the other, from lunary water spilt, owing to the circular movement of the air; and of these the evaporations (he says) are the foodstuffs of the Cosmos.
>
> Φιλόλαος διττὴν εἶναι τὴν φθορὰν τοῦ κόσμου, τὸ μὲν ἐξ οὐρανοῦ πυρὸς ῥυέντος, τὸ δὲ ἐξ ὕδατος σεληνιακοῦ, περιστροφῇ τοῦ ἀέρος ἀποχυθέντος· καὶ τούτων εἶναι τὰς ἀναθυμιάσεις τροφὰς τοῦ κόσμου.

Here, "destruction of the Cosmos," to begin with, does not mean "end of the world," after the manner perhaps of an *ekpyrosis*, but merely destruction of the Cosmos, as contrasted to destruction of the Uranos or the Olympos or the whole Sphaira. For these, namely, there is no danger of such destruction at all.

If that passage referred to our earth – which, however, is not in the Cosmos, but in the Uranos – and if we keep in mind that the sun is not hot, then only the "lunary water" would be left to pour down on us. Fire could then not fall down from heaven, but, in a volcanic manner, come up from the Central Body through subterranean caves. Yet, in that passage it just does not read "destruction of the Uranos." It reads "destruction of the Cosmos."

To translate here the word "cosmos" as "world" does not make sense. The Pythagorean "Cosmos" consists merely of moon, sun, and five planets, and these, of course, cannot be destroyed by "lunary water."

But immediately thereafter, "foodstuffs of the Cosmos" are mentioned, and this food is characterized as rarefied air, watery vapor, and rarefied heatstuff. Now, moon and sun need certainly not any food (as does the Indian moon that grows by the merits of the deceased, these merits then, in turn, being eaten away by the gods whereupon there is new moon [cf. Paul Deussen, *System des Vedanta*, 2nd ed. p. 393]). And besides, the "lunary water" (ὕδωρ σεληνιακόν, *hydor seleniakón*) does not mean any waters upon the moon, but the gassified, transparent water element in the humid moon-heaven.

The passage makes sense only if by "food of the Cosmos," by cosmic food, we understand food for the *inhabitants* of the moon *and* the sun who live on evaporations supplied to them by the revolving air stream of the world. And "destruction of the Cosmos" means destruction of cosmic life, that is to say: destruction of the inhabitants of the moon and the sun, by a weather catastrophe.

And just as it is said in that passage, such destruction is twofold:

If the revolving hot and dry air of the Uranos where we live spreads into the Cosmos, the inhabitants of the moon will pine away, be parched with thirst, and shrivel up. Simultaneously and by the same cause, the chilly, humid air in the moon stratum of the Cosmos, containing very much watery vapor (*hydor seleniakon*), is pushed up into the sun stratum of the Cosmos, and the inhabitants of the sun will suffocate, be drowned, freeze to death in the "lunary water" which, however, is not to be realized as a torrential rain or a deluge, but as the gassified, cool water element of the moon-heaven.

Incidentally, "destruction of the Cosmos" can also mean just merely danger of destruction. Such destruction need not actually occur. For that circular movement of the air, the revolving air stream, can as well remain normal in all eternity.

We on our earth are protected from such dangers. We are beings of four elements, hence not liable to be threatened with the influx of any new element and, therefore, there is no element we could not stand, provided it be not present in excess.

An increase or a decrease of the heat of the Central Body is not to be expected, however. That heat is an immutable property never lost of the tetrahedrons themselves, and their number is neither increased nor diminished.

'Antichthon,' the Counter-Earth

The number Ten of the world elements is the necessary result of a planimetrical construction, as has been shown, if a self-turning straight line is chosen as producing unit, and if to each stuff element its own functions are ascribed.

The number Ten, it is true, gave the Pythagoreans aesthetic satisfaction, and they were looking for the Ten wherever possible. They found it particularly interesting that the sum of the first four cardinal numbers makes ten. (The number 4 is called *tetras* [τετράς], but the "number space," as we should say today, from 1 to 4 is called *tetraktys* [[τετρακτύς], and the total of this number space is the *dekas* [δεκάς], or 10.) Another instance: the tetrahedron has 4 surfaces and 6 edges and also 4 corners and 6 edges.

However, it is still a long way from such liking for *seeking out* the number Ten to an intentional or involuntary *squeezing* it *into* such relationships as should remain beyond the reach of arbitrary will.

It has been said [1] that for the sake of the number Ten the Pythagoreans even invented a special celestial body, the *antichthon*, and allotted to this "counter-earth" a place between our earth and the hot Central Body. Yet, the Pythagoreans' predilection for the number Ten did by no means go so far as to make them advance a violent and perfectly phantastic hypothesis. It was for *objective* reasons that they assumed a counter-earth, and *the number Ten would have been better preserved without the antichthon*. For from the number of celestial bodies one has to *subtract* the hot Central Body in order to arrive at the number Ten.

Already Philolaos endeavored to explain the apparent motion of the sun around the earth by a turning of the earth. He had the sun imperceptibly slowly turn around the world axis, around an axis through the holkas-dodecahedron that is, while the earth is revolving around that same world axis quickly. The Olympos, or star-mantle, is rotating around the world axis with such a speed that the earth perseveres facing always the same part of the star-mantle. It takes the earth one day and one night for one revolution around the world axis. Exactly the same time it takes the Olympos for one rotation.[2]

As an astronomer of his day, Philolaos knew quite well that he must erect the axis for the turning of the earth neither perpendicular upon

[1] Aristotle, Metaph. I 5. 986a10; 58 B 4.

[2] Incidentally, what makes the Olympos rotate? There are two explanations possible. The one would be that the rotation of the Olympos has its cause in itself, in the self-mobility of the Olympos element, namely *pyr*, and this is forced into the form of spherical courses by the Holkas. But there is also another possibility that will be discussed later.

Greece nor let it go horizontal or oblique through Greece. For this would have resulted in wrong apparent orbits of the sun. The axis for the revolution had to be outside the earth, and the earth had to turn around the world centre.

With this view, to Philolaos *the world lost its equilibrium*. For then the world axis did not go through the world's centre of gravity. The weights of the sun, the moon, and the planets did not matter since, as has been shown, these bodies had the specific gravity of their respective surroundings and, therefore, by their movements could not dislodge the gravity centre of the world. But all the more was the earth in a position to do so, being heavier than its surroundings in the earth-heaven.

That is why our earth had to be given a counter-poise in a second earth, or antichthon, located on the opposite side of the world axis and having the same velocity of revolution as our earth, so that the world centre coincides with the world's gravity centre and for ever stays in the middle between the two earths.

Now there was only one more problem: the question of how to prevent the two earths from darting toward each other by their gravity.

For that purpose, one had to assume *a solid body* (not a sphere of gas!) *between them* and, besides, this solid body had to have self-mobility to carry the two earths along since the inert earth element does not move by itself.

Only an aggregate of self-mobile tetrahedrons could meet both of these requirements of solidity and self-mobility. It is, therefore, highly probable that the "Castle of Zeus" has to be realized not as a glowing gas ball, but as a solid body built of heatstuff atoms, a solid ball which the two earths (as disks) are sitting upon, passively turned along with it.

All the other celestial bodies are pulled along by the swing of the air only, an impetus transmitted from the Central Body to the Uranos and through this to the Cosmos, the moon- and sun-heaven. This revolving motion of the air is called "the roundabout swing of the air" (περιστροφὴ τοῦ ἀέρος, *peristrophé tou aeros*). The longer the distances of celestial bodies from the Central Body, the slower will be their respective revolutions. That is why the moon is revolving with greater speed than the sun, the real motion of which is hardly perceptible, according to Philolaos' view.

Location of the Counter-Earth

One can frequently read statements to the effect that the Antichthon had its place between the Central Body and our earth.

Such arrangement is physically unsatisfactory, in the first place. For in this case earth and counter-earth, as two bodies of equal weight, would have sunk down in the air until they would have been checked by the Central Body. Then they would have been either side by side, or else the Antichthon would have been immediately below our earth and, consequently, identical with the lower stratum of the earth. In addition, the gravity centre of the universe would have been dislodged by the Antichthon still more than it had already by the earth alone.

An arrangement of both earths on the same side of the Central Body does not even follow from the wording of the text. According to that passage in Aetios II 7, 7 (44A16), ten celestial bodies revolving around the Central Body are enumerated by Philolaos, that is to say, *with* the Central Body eleven. For the Central Body, just like the Olympos, is one "divine body" itself.

> (He says) that the first by nature is the one (sc., *pyr*) in the middle, but that around this ten divine bodies are dancing: the Olympos and the five planets, after them the sun, below which the moon, below which the earth, below which the counter-earth, inmidst all of which (there is) the *pyr* of the hearth, maintaining the order around the centre-parts.

> πρῶτον δ' εἶναι φύσει τὸ μέσον, περὶ δὲ τοῦτο δέκα σώματα θεῖα χορεύειν, <"Ολυμπόν τε καὶ τούς πέν>τε πλανήτας, μεθ' οὓς ἥλιον, ὑφ' ᾧ σελήνην, ὑφ' ᾗ τὴν γῆν, ὑφ'ᾗ τὴν ἀντίχθονα, μεθ' ἃ σύμπαντα τὸ πῦρ ἑστίας περὶ τὰ κέντρα τάξιν ἐπέχον.

Here the Central Body is mentioned first, and then begins the enumeration from the standpoint of an observer on our earth: first in the direction from above to below toward the earth and then down below our earth. Uppermost is the star-mantle, or Olympos, thereunder the five planets and the sun, thereunder the moon, thereunder the earth, thereunder the counter-earth. Now the enumeration is finished. For we must not count the Central Body a second time. We have it already at the start of the series as number One.

From this list, therefore, it merely follows that the counter-earth is in that direction beneath us, no matter whether it be between us and the Central Body or beyond the Central Body. But the first interpretation is physically unsatisfactory, the second makes sense.

True, at the end it says: μεθ' ἃ σύμπαντα. However, this μετά does not mean "after all these." For then the Central Body would be counted twice. It means "among all these in the middle," just repeating the first member of the series. If for no other reason, the Central Body cannot be the last member of the series because ten celestial bodies are announced of which a "dancing around the middle" can be predicated.

Another passage in Aetios (III 11, 3 [44A17]) runs as follows:

> Philolaos the Pythagorean (says) that the *pyr* is in the middle (for this [he says] is the hearth of the universe), but that second is the counter-earth, third the earth inhabited (sc., by us), situated and carried roundabout as well on the side opposite the counter-earth.

That is also (he says) why those who are on that (sc., other earth) are not seen by those who are on this (earth) here.

Φιλόλαος ὁ Πυθαγόρειος τὸ μὲν πῦρ μέσον (τοῦτο γὰρ εἶναι τοῦ παντὸς ἑστίαν), δευτέραν δὲ τὴν ἀντίχθονα, τρίτην δὲ τὴν οἰκουμένην γῆν ἐξ ἐναντίας κειμένην τε καὶ περιφερομένην τῇ ἀντίχθονι· παρ' ὃ καὶ μὴ ὁρᾶσθαι ὑπὸ τῶν ἐν τῇδε τοὺς ἐν ἐκείνῃ.

Peripheroméne (περιφερομένη) means here "carried roundabout," "being in a movement around a centre," without this centre being signified. It says neither "moving around the counter-earth" nor "moving around the *pyr* in the middle," but merely and shortly "moving roundabout."

Now, with the early Pythagoreans there is no other turning but around the world axis. Even the moon is turning around the Central Body, not around the earth. Therefore, only the words "situated opposite the counter-earth," ἐξ ἐναντίας τῇ ἀντίχθονι κειμένη (*ex enantias te antichthoni keimene*), are left as belonging together.

Under such circumstances, however, the counter-earth is opposite our earth only if the Central Body is between the two. If, instead, the counter-earth were located between us and the *hestia*, then the counter-earth would have to be called not "lying on the opposite side" (ἐξ ἐναντίας κειμένη), but "lying below," ὑποκειμένη (*hypokeimene*).

In this passage, the celestial bodies are enumerated not from without inwards, but from within outwards. Here, the Central Body is not contrasted to the ten celestial bodies revolving around it, but is mentioned as the first body. Accordingly, this enumeration results in *eleven celestial bodies.*

In closest and equal distance from the *hestia*, in fact sitting upon it, there are the earth and the counter-earth. Hence, it makes no difference whether one says, "secondly the earth and thirdly the counter-earth" or "secondly the counter-earth and thirdly the earth." But the latter way of enumeration has the advantage that as the first and second celestial bodies those two are mentioned which are for ever invisible to us whereupon, continuing thirdly with the earth, the series of the bodies visible to us follows.

It was indeed this subdivision that occupied the mind of the reporter. For he forthwith adds the reason why that second celestial body remains invisible to us. The reporter has failed to say, "secondly and thirdly *ex aequo*," because he did not think of the possibility of any misunderstanding. The words, "lying opposite the counter-earth" seemed clear enough.

Thus, *the number Ten cannot have been the motive for constructing the Antichthon*. For there are *eleven* celestial bodies *with* the counter-earth, and *ten* only *without* the counter-earth. The number Ten applies merely to those "divine bodies" which are revolving around the Central Body

while this, as the *hegemonikón* (ἡγεμονικόν), the "leading one," is itself among these bodies the *eleventh*.[1]

* * *

These, then, are in the main the Pythagorean ideas about the structure of the universe, according to Stöhr's reconstruction.[2]

From Philolaos to Copernicus

The cosmology of the Pythagoreans shows something very remarkable: They did not find at once the heliocentric system, though, but from the very outset they *did not even begin with the geocentric system*. And as a matter of fact, the hypothesis of Philolaos was the first stage of the Copernican hypothesis.

This was the course of the historical development:

By visualizing the earth and the counter-earth as closed to a spherical layer, one arrives at our modern conception of the spherical shape of our planet, and the Central Body becomes the hot interior of the earth. Not yet modern is the position of the earth within the universe. For now the world axis goes through the earth centre, and the earth has only a rotation, but no revolution. Such is the view taken by Hiketas of Syracuse, Heracleides the Platonist, and Ekphantos the Pythagorean.

As a consequence of the closing of earth and counter-earth to the earth ball, the Central Body loses the capacity of emitting light, that is to say, of stirring intensively the surrounding air. Therefore, the sun could not be treated any more as a mirror that merely let enter into its sieve-like surface the heat and light rays and emitted them again in radiating lines by way of refraction in the interior of the sun-crust, a

[1] In the *Haggadah* for the Jewish Passover feast, there is among other culturally and historically interesting pieces a number game from 1 to 13 in the form of questions and answers, beginning with: "One who knows? – One I know: One is our God who is in heaven and on earth." This game contains a puzzling line: "Eleven who knows? – Eleven I know: There are eleven celestial bodies." All kinds of abstruse explanations have been suggested by the commentators, as, *e.g.*, that this allegedly refers to the eleven brothers of Joseph. To me, there is no doubt that here are meant the eleven celestial bodies of the Pythagoreans. Pythagoreanism became very popular among the Jews.

[2] It may be worthwhile pointing out that that trichotomy, so conspicuous in Plato's *Timaeus* and thereupon persisting till the end of the middle ages, the trichotomy into earth-heaven, heaven of the planets, and heaven of the fixed stars, is actually throughout Pythagorean.

process designated by Philolaos as "sieving through" (διηθεῖν, *diethein*). Instead, the sun was made again a self-luminous and hot body.

Then Aristarchus (about 281/80 B.C.) pushes the sun centre into the world centre and the earth aside. By that, the earth gets a double turning, a rotation around its own axis and a revolution around the world axis. On that account, Aristarchus was accused of atheism by Cleanthes the Stoic.

Advanced by Aristarchus merely as an hypothesis, this view was then substantiated scientifically by Seleukos of Seleukia (about 150 B.C.), the Copernicus of antiquity.

Subsequently, all this was suppressed by the authority of Plato and Aristotle, just as in modern times the doctrine of Copernicus was suppressed by Luther and Melanchthon.

Rather late the heliocentric system was suppressed also by the Catholics. The work of Copernicus was put on the *Index librorum prohibitorum* not until 1616 where it remained until 1757. And it is extremely interesting that about 200 years before Copernicus the Catholic Church did not mind it at all that Albert of Saxony,[1] the first Rector of the University of Vienna, taught as an hypothesis exactly the same as did Copernicus later on ...

Who Is Turning the Spheres?

In man, as has been shown, there is a harmony, a proportion of 2:1, because in him there are 8 world elements containing 4 stuff elements. Could not perhaps the Pythagoreans have considered the harmony of the universe – 10 world elements : 5 stuff elements – a divine harmony, in the sense of this whole world being the body of a god?

There is indeed in later reports some mention of a Demiurge, as, *e.g.*, in the passage:

> But the leading principle is (they say) in that *pyr* which is in the very middle, and which in the manner of a ship's keel was made the fundament of the ball of the universe by the world-forming god (*demiurgos theos*).
>
> τὸ δὲ ἡγεμονικὸν ἐν τῷ μεσαιτάτῳ πυρί, ὅπερ τρόπεως δίκην προϋπεβάλετο τῆς τοῦ παντὸς <σφαίρας> ὁ δημιουργὸς θεός.
>
> *Aet. II 4, 15; Stob. I 21, 6d; 44A17.*

[1] Albert of Saxony taught in Paris since 1351, was Rector of the University of Paris in 1353, became the first Rector of the University of Vienna, founded in 1365, was made bishop of Halberstadt in 1366 where he died in 1390.

True, this could perhaps have been an influence already of Platonic doctrine – unless one is rather inclined to assume, just the other way round, that like so many other things in Plato also the conception of a Demiurge is Pythagorean, originally.

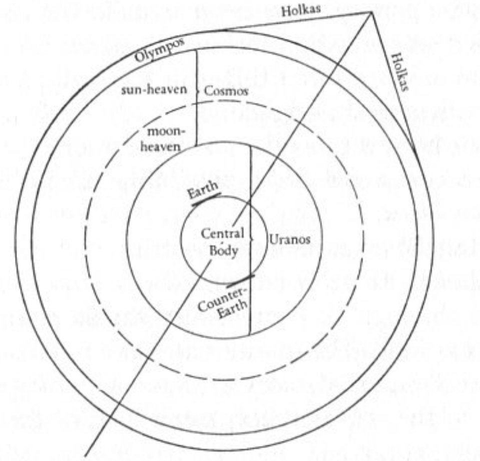
At any rate, however, as far as the extant textual evidence is concerned, one can about that possibility of a "divine harmony" merely say: *non liquet*. It could, of course, still be true that something like that was taught as an esoteric doctrine.

Yet, even though there is nothing about it in the sources handed down, at least the logic of composition should compel us to assume something of that kind. The question is, namely: Who is turning those spheres? Is it really a satisfactory explanation to say that that turning is merely due to the self-mobility, never lost, of the tetrahedron element?

Already in the foregoing presentation of the elements doctrine of the Pythagoreans, it has been pointed out that their *apeiron* does certainly not mean an empty space, but the filling of space with a penetrable X. Could not that *apeiron* have been perhaps a filling similar to the Nous of Anaxagoras, a filling in which the atoms are embedded, a purest and thinnest stuff filling the whole world, a filling in which the *holkas* is embedded together with its contents?

There is, of course, no knowing whether the Pythagoreans actually have realized it in this way, and the *apeiron*-question is and remains an open question, strictly speaking. But according to the inner logic of construction, that interpretation could very well be correct. There would then be there a god who, as to his mind, would be supreme reason and, as to his body, the world, just as with Xenophanes, Heraclitus, and others.

And just as the *Heis Megistos* of Xenophanes "keeps swinging everything around," *panta kradainei*, so this god, too, would keep the celestial spheres in motion as parts of his own body by the power of his will. He would from the Olympos – one would then understand why that uppermost and outermost all-encompassing sphere was called Olympos – see and know everything. And He would also be that being which eternally remains the same, for ever rotating within the same space – which is exactly what also Plato teaches in the *Timaeus* ...



METEMPSYCHOSIS AND THE ALLEGED ETERNAL RECURRENCE OF THE SAME

Among the many problems concerning the basic items of the original Pythagorean doctrine, there are two that can be solved by way of mere conjecture only: the problem of the so-called transmigration of souls and the problem of world periodicity and the eternal recurrence of the same, as allegedly taught by the Pythagoreans.

With transmigration, the difficulty is to understand just what exactly the Pythagoreans may have meant by it. As to periodicity, however, the question is whether the reports about it are true at all.

What is supposed to migrate?

There can be no doubt that the Pythagoreans did believe in transmigration. To all appearances, this belief is even one of the oldest ingredients of the doctrine and obviously goes back to Pythagoras himself already. True, he has not left anything in writing. But there are those verses by Empedocles (fragment 129) palpably alluding to Pythagoras and his "ten and even twenty human lifetimes." And still earlier, Xenophanes already was mocking at Pythagoras' belief in transmigration:

> Once he passed by, they say, when a little dog was maltreated,
> And, feeling pity for it, cried out loud this word:
> "Stop it and do not beat! For it is indeed the soul of a
> Friend which I have recognized when I have heard its voice."

> Καί ποτέ μιν στυφελιζομένου σκύλακος παριόντα
> φασὶν ἐποικτῖραι καὶ τόδε φάσθαι ἔπος·
> 'παῦσαι μηδὲ ῥάπιζ', ἐπεὶ ἦ φίλου ἀνέρος ἐστίν
> ψυχή, τὴν ἔγνων φθεγξαμένης ἀΐων.'
>
> *Xen. fr. 7 (Diog. Laert. VIII, 36).*

But the question is: What is it that here is supposed to migrate? These are Stöhr's ideas concerning this problem:

* * *

It is not easy to guess *what* was supposed to migrate, according to Pythagoras' belief. In the Pythagorean doctrine, namely, we find no mention of an invisibly fine and yet material body as in the Indian *saṃsâra* belief, no analogon to the *sukṣmaṃ śarîram* that survives the coarse-material body, migrating into the smoke, the cloud, the rain, into various vegetable, animal, and human bodies and possessing the coarse-material body like a garment only, like a perishable frame that is equipped with perishable tools. For the Pythagoreans knew matter of one kind only and did not know either of any possibility of redemption from it since this would have meant severance of the element from its function.

That something supposed to migrate, according to Pythagoras, is called by Xenophanes in those famous verses (fr. 7) the *psyche*. This word does here not mean "soul" in the sense of an immaterial substance, the function of which is successively tied to various bodies. And much less even is the term *psyche* here to be taken in its Pythagorean meaning. For according to Pythagorean terminology it signifies, as has been shown, the unconscious physiological function of breathing and blood movement, as contrasted to sense perception (*aisthesis*), intellect (*nous*), and desire (*eros*).

Xenophanes uses here the word *psyche* in its Homeric primitiveness, with the meaning of the departed shadow that has gotten not into Hades, but into a young dog. This Homeric shadow is completely unfit for a belief in transmigration. For it is not living (like the *sukṣmaṃ śarîram*), but is capable and in need of being restored to life by blood, being itself not a vivifying principle, but a powerless residue of life, a human shadow that has human shape essentially, whereas that migrating principle is neither human nor animal nor vegetable, but changes all these forms like unessential garments. And Xenophanes, after all, had merely the intention just to ridicule that belief in a transmigration of souls.

Any such transmigration, obviously, requires something that does the migrating and is in contrast with the bodies through which it migrates. This migrating something must be either fine-material or immaterially and inextensively psychical or a mixture of both. It must

not be a function of the coarse-material (or even the fine-material) body. It is hardly probable that such simple logic should not have been at the disposal of Pythagoras. As a matter of fact, however, the psychical has indeed been interpreted by the Pythagoreans as a function of the elements.

If, beside the five elements and the five groups of functions of the elements, also an (immaterial) migrating principle had been assumed that was in the body as in a garment, then not the number Ten, but the Eleven would have been the subject of veneration. Also the Sâṃkhyas did not fail to mention, in addition to their twenty-four material principles, the *puruṣa* as a twenty-fifth and immaterial principle.

With regard to the scantiness of the reports, it is extremely doubtful whether it will ever be found out what in fact were the ideas of the early Pythagoreans about that transmigration of souls. Here merely hypothetical answers seem to be possible.

There appears to be nothing else left but to assume that, just as Heraclitus and Empedocles, also the Pythagoreans might have meant by that wandering something an aerial-ethereal structure, some sort of a fine, invisible organism, that has a longer life than the coarse, visible organism. Then there would indeed be a living wanderer, and the number Ten of the world elements would still be preserved.

The Ostensible Periodicity

But now the big question is: This fine surviving organism – how long is it, then, supposed to live?

With Empedocles or Heraclitus, the answer is easy and plausible. Obviously, both would say: "for the duration of a world period." Also in India, and in Asiatic culture in general, this opinion is prevalent. But how is it here? Did the Pythagoreans assume a periodicity of the world occurrence?

Strictly speaking, an answer to this question is impossible. For too little evidence has been handed down. There are only two passages pointing seemingly in that direction.

The one is that report in Aetios that according to the Pythagoreans there is a "twofold destruction of the cosmos" by fire streaming down from heaven and water coming down from the moon. Therefrom people concluded that the Pythagoreans must have taught a dissolution of the world, and it would have been only natural that then would come again a new origination, and so on.

But that has to be flatly rejected. For, as has been shown, according to Pythagorean phraseology destruction of the "cosmos" does not mean destruction of the "world," but merely destruction of life in the "Cosmos," on the moon and on the sun that is. Which, however, would not be any concern of ours. Furthermore, "Uranos" in that report does not mean "heaven," but the innermost sphere of the world, containing the earth, the counter-earth, the hot Central Body and the sublunary atmosphere. From this "Uranos" no fire could stream down to the earth. Fire could only, in a volcanic manner, stream up to the earth from the Hestia.

Yet, as already pointed out, a devastation of our earth is not even meant, but a stream of relatively hot and dry air that would be fatal to the inhabitants of the moon. For the word *pyr* does here not mean a stream of fire, but the heat element within a hot and dry stream of air. Nor does "lunary water" (*hydor seleniakon*) mean any ocean hanging above our heads or a torrential rain pouring down from the moon. It merely means the water element that, in gaseous form, is the main ingredient of the moon-heaven and would become dangerous to the inhabitants of the sun if carried too far upwards in the Cosmos, while it could hardly do any harm to us.

And besides, all this is just a possibility. There is no necessity at all that such a destruction of the life of the inhabitants of the moon and the sun will ever actually happen.

This passage, consequently, proves nothing concerning periodicity. The Pythagoreans could have assumed periodicity all the same, of course. But this passage, at any rate, is no evidence.

And then there is another passage that is also somewhat strange.

In Simplikios' commentary to Aristotle's *Physics*, Eudemos the Aristotelian is quoted as saying in his lectures as follows:

> But whether the same time occurs (again), as some people maintain, or not, this could be doubted. ... If, however, one might believe the Pythagoreans, so that numerically the same (things always come) again, then I myself, too, shall (again), with the rod in my hand, be lecturing (here) to you who are sitting (before me), exactly so (as now), and everything else will likewise be the same, and then it is also logical that the time be the same as well. For of one and the same movement, but likewise also of the many identical things, the "before" and the "after" is one and the same, and of course also their number. Everything, consequently, is the same and, therefore, also the time. [In other words: exactly the same time, the same places, the same persons, the same situations.]

ὁ δὲ αὐτὸς χρόνος πότερον γίνεται ὥσπερ ἔνιοί φασιν ἢ οὔ, ἀπορήσειεν ἄν τις . . . εἰ δέ τις πιστεύσειε τοῖς Πυθαγορείοις, ὥστε πάλιν τὰ αὐτὰ ἀριθμῷ, κἀγὼ μυθολογήσω τὸ ῥαβδίον ἔχων ὑμῖν καθημένοις οὕτω, καὶ τὰ ἄλλα πάντα ὁμοίως ἕξει, καὶ τὸν χρόνον εὔλογόν ἐστι τὸν αὐτὸν εἶναι. μιᾶς γὰρ καὶ τῆς αὐτῆς κινήσεως, ὁμοίως δὲ καὶ πολλῶν τῶν αὐτῶν τὸ πρότερον καὶ τὸ ὕστερον ἓν καὶ ταὐτόν, καὶ ὁ τούτων δὴ ἀριθμός· πάντα ἄρα τὰ αὐτά, ὥστε καὶ ὁ χρόνος.

Eudem. Phys. B. III fr. 51 (Simpl. phys. 732, 26); 58B34.

What here Eudemos ascribes to the Pythagoreans looks exactly like a belief in the eternal recurrence of the same.

However, that whole passage is not quite clear, in the first place. What was believed by the Pythagoreans themselves and what was merely taken for Pythagorean doctrine by non-Pythagoreans? Furthermore, is the *whole* passage meant as a rendering of the Pythagorean tenets according to their interpretation by Eudemos? Or does Eudemos here first state the "recurrence of the same" as a premise and then, beginning with the word κἀγώ ("then I myself, too") add his own conclusions, to the effect that there will be simultaneous recurrences of all persons in like situations? In these conclusions, he was presumably in accord with other non-Pythagoreans and may even not have been the first to draw that inference.

Eudemos' presupposition obviously is that the Pythagoreans believed in a periodical dissolution of the world in the manner of the Heraclitean *ekpyrosis*. Then, of course, in an eternal recurrence, exactly the same results would have to follow from exactly the same ever recurrent initial states, and this is indeed the conclusion the Stoics have actually drawn.

It is even very well possible that that report in Aetios about a twofold destruction of the "cosmos" allegedly through fire streaming down from heaven and water pouring down from the moon had already long before Aetios, and perhaps with the same words, been handed down to Eudemos. Then, of course, that misunderstanding is easily accounted for.

* * *

But supposing Eudemos were right, supposing the Pythagoreans did teach an eternal recurrence of the same – then one could not quite understand how the destruction and reconstruction of the world are supposed to take place. With Empedocles, we have a clear insight into the constructing and destructing powers: they are Hatred and Love. With Anaxagoras, we have an insight into the constructing power, the Nous, and the rest we can easily complement by ourselves: Nous just discontinues Its activity, and the world sinks back into the Pantahomou. But here, with the Pythagoreans, it is not clear what the constructing and destroying power shall consist in, and whether they might not rather have taught the eternity of the world.

True, in later reports, as already pointed out, sometimes a Demiurge is mentioned, and this fact should not be slighted. That need not be due to Platonic influence. It could as well indicate that, as so many other things in Plato, also the conception of a Demiurge is Pythagorean property. At any rate, however, this would still not yet imply that such a Demiurge will construct and destruct periodically. The "construction" of the world by the Demiurge could as well be shoved back into eternity, just as it is in Plato. That is to say, for didactical reasons, for the sake of presentation, would the world's simultaneous existence have been drawn asunder into the succession of a genesis.

Thus, while that report in Aetios is completely unfit as evidence for periodicity, the Eudemos quotation in Simplikios yields but a precarious "*non liquet.*"

Another Possible Explanation

Stöhr has pointed out that there is still another possibility of an explanation of the Pythagorean belief in transmigration and also of how one could have come to think that the Pythagoreans assumed an eternal recurrence of the same. But Stöhr has expressly emphasized that this is purely hypothetical.

* * *

It is possible that the impulse to a certain belief came from the sphere of astronomical facts. The Pythagoreans believed in the eternal recurrence of the same constellations of the celestial bodies. Why should not be there a recurrence, also, of exactly the same human being after some long interval? Why should not be there a closed chain of generations, just as there is a closed series of stars constellations? Let us suppose that the son of A is not like A, but merely similar to A, and that the series of generations runs till Z. The son of Z will again be exactly like the forefather A.

Far be it from my thoughts to conjecture even that this was actually the Pythagorean belief in the recurrence of exactly like persons. To say it once more, I deem it impossible to find out the real dogma of the Pythagoreans. I merely want to point at a possibility.

Such a belief would have had some logic. It would suffice to distinguish between father-like and mother-like children. The series of generations from A to Z can, for instance, alternately contain father-like daughters and mother-like sons. The mother-like children of the same pair form again among themselves a similarity series, and so do the father-like children. Genuine twins (from one egg that is) are equal.

Then any person has already existed infinitely numerous times. And any person can infinitely often return. The generations chains can also die out. The generations chains are running with unequal velocities. Hence, those like persons will not return simultaneously.

This sort of eternal recurrence could possibly have been called "transmigration of souls" by non-Pythagoreans. They might have

thought such an identical person must in the meantime before returning have been hidden in some other living beings.

Whether this really was what the Pythagoreans believed nobody is in a position to know. But supposing our hypothetical assumption were correct, then one could easily understand that the possibility of an eternal recurrence and the belief in an infinity of pre-existences might have been misinterpreted by non-Pythagoreans. Eudemos as well as those who had handed down that interpretation he has advanced could very well have overlooked that from the recurrence of undistinguishably like persons does not at all follow a simultaneity of the recurrence of all those who at one time were together in existence. Person A returns perhaps after 360 years, and person B after 400 years. For, as already pointed out, the generations chains have different velocities. Therefore, the consequence will not be a likeness of situation. But what does follow from that is a similarity of fate as far as fate depends on a person's character, gifts, and inclinations, since only these will recur in undistinguishable likeness. He who returns will, also, be given a different name.

Eudemos, however, once he erroneously assumed a simultaneity of recurrence, could then easily come to believe that the Pythagoreans were teaching a periodicity of the world occurrence.

Let us pretend this conjecture is correct and the Pythagorean doctrine of a "transmigration of souls" means properly that eternal recurrence of the same persons. Then, in this way, the eternity of the world and the number Ten of the world elements could very well be combined with the eternal recurrence of the same persons, without any need for the additional assumption of an eleventh principle, a psychic substance.

True, in Aetios IV 7, 1 (59A93) it says:

> Pythagoras and Anaxagoras and Diogenes ... have declared that the *psyche* is indestructible.
>
> Πυθαγόρας μὲν καὶ Ἀναξαγόρας καὶ Διογένης . . . ἄφθαρτον εἶναι τὴν ψυχὴν ἀπεφήναντο.

This sentence could mean that "the *psyche*" was considered an indestructible substance beside the stuff elements. But it can as well mean, as far as Pythagoreanism is concerned, that the functions *psyche*, or breathing and blood movement, and *aisthesis*, or sense perception, are indestructibly tied to the indestructible heat element; that the function of thinking is tied to the movement of the air element, and the function of emotion, to the water element, both of these functions being likewise indestructible because the self-mobility of the heat element will never give the other elements any rest.

If, however, the other interpretation is right and that something which survives the death of the body is a fine-material, aerial-ethereal structure, then the consequence would have been different. For if the

Pythagoreans did not teach a periodicity of the world occurrence, then they would of necessity have had to take that *psyche* as likewise indestructible and eternal. For else – what would have been the borderline to be drawn?

Considering that to all appearances the belief in a transmigration of souls is one of the oldest items of the doctrine and was perhaps indeed taken over from Orphicism or even from India, the possibility cannot be excluded that it was really meant in this way.

The motive, at any rate, for the adoption of a belief in transmigration – if indeed the Pythagoreans had that belief – must have been the same as that prompting quite in general the rise of such a belief: the desire for a satisfying extension of the chain of retaliation beyond birth and death.

The dietary regulations, however, of the Pythagoreans do not seem to have anything to do with transmigration of souls. Here there might have been at work partly aesthetic and hygienic considerations, may be even with a view to longevity, partly perhaps also a superstition to the effect that by eating the flesh of certain animals one might be liable to acquire the qualities of those animals.

THE UNIVERSAL DICHOTOMY IN NATURE

According to the report in Aristotle (Metaph. I, 5. 986a22; 58B5), the Pythagoreans have advanced a table of ten fundamental contrasts:

The Table of Contrasts

1) πέρας καὶ ἄπειρον (*peras kai apeiron*), border-surfaces of the atoms and that limitless space-filling something in which the space-cutting, space-limiting surficial atoms are embedded.
2) περιττὸν καὶ ἄρτιον (*peritton kai artion*), (the series of the) odd and (the series of the) even (numbers).
3) ἓν καὶ πλῆθος (*hen kai plethos*), one and many.
4) δεξιὸν καὶ ἀριστερόν (*dexion kai aristeron*), right and left.
5) ἄρρεν καὶ θῆλυ (*arrhen kai thely*), male and female.
6) ἠρεμοῦν καὶ κινούμενον (*eremoun kai kinoumenon*), resting and moved.
7) εὐθὺ καὶ καμπύλον (*euthy kai kampylon*), straight and crooked.
8) φῶς καὶ σκότος (*phos kai skotos*), light and darkness.
9) ἀγαθὸν καὶ κακόν (*agathon kai kakon*), good and bad.
10) τετράγωνον καὶ ἑτερόμηκες (*tetragonon kai heteromekes*), the equilateral and equiangular quadrangle, or square, and the quadrangle with unequal sides and angles.

It gave the Pythagoreans undoubtedly great aesthetic satisfaction that this table contained ten pairs of contrast, and not nine or eleven.

However, it is still very doubtful whether to obtain the number Ten was the only purpose of the composition of that table, as many non-Pythagoreans believed.

Take, for instance, the contrast "right and left." The first Pythagorean to make up this table, or that first person to whom the orally transmitted idea has to be traced back, must have been struck by the fact that we have a left eye and a right eye, but not a third eye in the middle; a left and a right nostril, but not a third in the middle. He found it conspicuous that in all its body formations nature employed dichotomy, and not trichotomy.

And indeed, even the quinquepartite seahedgehog consists of five parts, in each of which a symmetry between right and left can be discerned. That is to say, this is a multiplication by five of a dichotomy, but not a division into fifths. When regarding our arms, we find again such dichotomies. The whole arm is divided into the upper arm and the lower part; this, in turn, into the forearm and the hand; the hand, into the ball of the thumb and the fingers; the fingers, into a quaternary of fingers and the opposable thumb; the number of the fingers is again doubly biarticulate; the individual finger, in turn, consists of the upper part and the lower parts, and these, again, of two members.

Or the contrast "male and female." Here, too, there is a dichotomy, and not a trichotomy. Even our present knowledge about trimorphism and tetramorphism is no contradiction. The bee-eggs have to be classified into non-fecundated ones and those in need of fecundation, which is merely a dichotomic classification. From the fecundated eggs either a worker-bee originates or a queen, depending on care and nutrition, which is again a dichotomy, and not an immediate trichotomy.

It is the universal dichotomy in all things natural – and here, according to the Pythagoreans, belongs also the series of the cardinal numbers which they divided into the series of the even and the series of the odd numbers – it is this universal dichotomy, in contradistinction to a division into many parts, that that table is to express, and not the accidental number Ten. The Pythagoreans will no doubt have very much rejoiced at this number Ten, but that was certainly not their main concern. That that table resulted in exactly ten pairs of contrast gave them pleasure, to be sure, just as they were pleased with the fact that man has ten fingers.

The Pythagoreans have here indeed by divination anticipated something that later on has been substantiated: that any growth of organisms rests on the bipartition of cellular nuclei.

The universal dichotomy is a consequence of the manner of production. When a line, by turning itself, produces the space of an angle, there are there just only two, and not three, lines, and the angle-space can be symmetrically divided by a bisecting line.

Hence also the symmetry-planes in the equilateral polyhedrons. The cube has nine symmetry planes, six of which go through the edges themselves, while three go through the centre-points of the edges. The symmetry-planes through the centre-points of the edges have nothing to do with the way of origin of the cube. Therefore, they are not "natural," but merely "artificial" symmetry-planes. Hence from these one gets not a natural, but only a geometrical right and left. That is also why by two, three, or any number of planes of partition in this direction one can get three, four, or any number of parallelepipeds equal to each other which, however, are just merely artificial parts, not natural members. But a symmetry-plane through the edges divides the cube into a genuine right and left. In this diagonal direction, or parallel to it, one cannot obtain three parts equal to each other. One gets always only two symmetrical side-pieces and one dissimilar middle-piece.

Notions of relation, such as likeness and unlikeness, were still taken by the Pythagoreans for qualities between things themselves, independent of human intellect. That is why they had also that division of the quadrangles into the equilateral and equiangular ones, or squares, and the ones with unequal sides. There are no two pairs of lines to be neither equally nor unequally long, but something third. Nor are there any two angles to be neither equal nor unequal. Here, too, there is no trichotomy. Yet, here there are mixtures, such as the oblong and the rhombus.

Group Designations

The tenth pair of contrast is also a hint that the terms of that table are partly to be taken as group designations, naming a whole group after one outstanding example.

Thus, to the tenth group belongs obviously also the contrast of the equilateral triangle to the one with completely unequal sides, whereas the isosceles triangle is not a third contrary contrast, but a combination of the two contrasts. Quite generally, any equal and unequal belongs to this group, as, for instance, $5 + 5$, on the one hand, and $1 + 2 + 3 + 4$, on the other; 3×3, or product of equal factors, and 3×4, or product of unequal factors. *Tetragonon* (quadrangle) means the equiangular, equilateral quadrangle as well as the product of two equal factors. And *heteromekes* means any n-angle with unequal sides as well as a product of unequal factors.

There is dichotomy also in the field of sensation quality: light and darkness. This term, too, is a group designation. Here belongs the contrast "hot and cold" as well, of course. The gradation warm-cool is merely caused by an incomplete compensation of the contrast, just as twilight is due to a mixture of light and darkness.

Right-left was likewise a group designation: for the universal dichotomy in natural bodies, even where the parts are not symmetrical to each other, such as the upper arm and the lower part that itself shows continued dichotomies.

To the group good-bad belong also, of course, beautiful and ugly, true and false, truthful and mendacious, healthy and sick.

The contrasts in that table are empirically collected proofs of the dichotomy to be found everywhere in nature as the result of a self-division that itself, in turn, is the consequence of a preceding self-reduplication. The number Ten arrived at in this way was to the Pythagoreans certainly a source of great pleasure. Yet, it was evidently not a sufficient motive for putting together pairs of contrasts just for the fun of it and without any intention of proving by that something else.

THE SYMBOL OF JUSTICE

When the equal times equal number, a square that is, such as the number Four or the number Nine, is mentioned as the symbol of justice, then here the Four has to be interpreted quite differently from the Six for *psycha*, the Seven for *hygeia*, and the Eight for *eros* and *philia*. Not the fourth place in the natural order of the world elements is here the point in question, but the following:

An Ethics of Forms

Our pleasure in musical tuning is based, ultimately, on the simplest proportions of the lengths of strings, the octave corresponding to the proportion 1:2, the fifth, to the proportion 2:3, the fourth, to 3:4, and so on to the big whole interval 8:9 and the small whole interval 9:10. In the same way, our pleasure in the deeds of men depends not on the contents of the individual deed, but on the simplicity of the dimensional relations between each other of deeds and sufferings.

Any relationship of retaliation presupposes a doer facing somebody else who suffers the doing. Likewise, in the square the one side is opposite the one parallel. Furthermore, the avenger faces somebody upon whom a deed is retaliated. And in the square, too, there is another pair of opposite sides. The doer is identical with him upon whom the deed is retaliated later on. Also the one side of the square, having originated from the other side through turning by 90°, is identical with it, as it were ("unsplit" and "one-like"), and therefore of equal length. Moreover, a perfect retaliation requires that the avenger be personally identical with him who originally suffered the deed to be paid back. That is why also the third side is of equal length with the fourth side and, so to speak, identical with it ("one-like"). And just as in perfect retaliation an evil is substituted for by an equivalent evil and a benefit by an equivalent benefit, so in the square, too, the second side is equal to the third side. Consequently, all of them are mutually equal.

Yet, this does not perhaps mean that there is justice in order that the nature of the square or of the number Four may manifest itself in it. It might have meant that our pleasure in justice has the same cause as our pleasure in musically pure tuning. It is the simplest dimensional relations that are here as well as there.

Comparison with Indian Doctrine

Apart from such ethics of forms, there might have been, along with it, also a philosophical speculation:

Just as the straight line is the producing One, or monad, of the tetrahedron, the octahedron, the icosahedron, the cube, and the dodecahedron, so is any deed a producing One, so to speak. Each deed entails an equivalent retaliating deed. All human deeds and sufferings form automatically a texture of retaliation.

To some extent, this view reminds of the Indian theory of occurrence. However, there is an essential difference. According to Pythagorean opinion, the chain of retaliation is not the basis of the phenomenon of matter in its entirety. Here, on the contrary, matter is the basis of the phenomenon of retaliation. According to Indian view, furthermore, the chain of retaliation stretches through eternity without interruption, and there can be a long respite for the retaliation of a deed. In Pythagorean view, however, it is the chain of material occurrences that is closed without interruption while, in human life, the chain of retaliation begins with a deed retaliating nothing and ends with a deed, or a suffering, retaliated by nothing.[1]

On the other hand, just the very fact that so many deeds (or sufferings) remain without retaliation may indeed, in logical consequence, have prompted a belief in transmigration of souls, the assumption of a postexistence and a pre-existence.

It would, of course, be easy to construct also into Pythagoreanism a chain of retaliation after the manner of the Indian *saṃsâra*. It would be possible, namely, to have guilt and merit be attached to the stuff of the body. When such a body enters another body in the form of food, that other body would receive the hereditary guilt and merit tied to that stuff. Accordingly, it would make a difference whether one eats the flesh of a beast of prey or of a herbivorous animal. And when one and the same body serves as food for several other bodies, the hereditary guilt and merit would be distributed among those many living beings.

Yet, such construction would obviously be altogether unhistorical and on a perfectly wrong track.

* * *

NUMBER AND THE 'ESSENCE OF THINGS'

One can, of course, not finish a presentation of Pythagoreanism without discussing that time-honored and almost sacrosanct assertion usually put at the beginning of any presentation of the doctrine: the

[1] On the Indian notion of causality cf. Richard Garbe, *Die Sâṃkhya-Philosophie*, pp. 179 and 180, also p. 228ff. and Paul Deussen, *Das System des Vedânta*, 2nd ed., p. 275ff.

statement that the Pythagoreans allegedly taught that number was "the essence of things."

That would mean that things are merely manifestations of numbers, as it were; that there exists nothing but numbers, properly; that anything else is only seemingly real, representing to us, in a symbolic manner, the nature of number.

Such opinion is called number mysticism and can be found all over the world in some form or other. It is a widespread superstition and, although considered idiotic by normal persons of common sense, is almost ineradicable.

The Pythagoreans, then, were, and have been and still are, taken for number mystics, or, as Aristotle has put it, for people who

> believe the elements of the numbers to be the elements of all the things that there are,
>
> τὰ τῶν ἀριθμῶν στοιχεῖα τῶν ὄντων στοιχεῖα πάντων εἶναι ὑπέλαβον,
>
> *Arist. Metaph. I 5. 986a1; 58B4.*

or, shortly:

> number to be the essence of all things.
>
> ἀριθμὸν εἶναι τὴν οὐσίαν ἁπάντων.
>
> *Arist. Metaph. I 5. 987a19; 58B8.*

There can be no doubt that the characterization as number mystics holds true of the Neo-Pythagoreans who in the last century B.C., three hundred years after the extinction of the original movement, tried to revive the old doctrine, re-interpreting it in their own way. But does it apply also to those sages of old, the adherents of the genuine Old-Pythagorean teachings?

Stöhr has answered this question in the negative.

* * *

A Source of Misunderstandings

The secrecy of the Pythagorean doctrine seems to have been applied, above all, to the astronomical hypotheses since by these the residence of the gods was quite substantially dislodged, and the national gods became superfluous, properly. Their names had become allegorical designations for the elements and their functions. Keeping the doctrine secret, therefore, may have been a precautionary measure of the Pythagoreans to protect themselves from intruding curiosity, molestations, and unnecessary persecutions. For as a matter of fact, the

hypothesis of Philolaos was the first stage of the Copernican hypothesis, after all.

Considering that secrecy, it was only natural for the non-initiated to reconstruct the tenets of the Pythagoreans from the superficialities of their costume and their habits of life, from single results that happened to get abroad without their argumentation being communicated, and from such fragments of the doctrine as came to be known in wider circles.

In this way, many misunderstandings may have come about. Such things happen also nowadays, to be sure. Concerning fourdimensional space, for instance – "fourdimensional" as to the point as "generative" element that is –, one can sometimes meet with an offhand reconstruction to the effect that there are people who allegedly believe that four straight lines could intersect under right angles in one and the same point and in one and the same (Euclidean) space, and that it is in this sense that those people believe in a fourth dimension. Things may have been similar in antiquity. The Pythagoreans, to all appearances, did not have the right reporters. Mathematicians would have been much more apt to find out. Aristotle however, who is one of the main sources about Pythagoreanism, has obviously misunderstood quite a lot. After all, to him also Heraclitus was "the Obscure."

Common Greek opinion among non-Pythagoreans had it that, beside political, religious, and ethical ends, the mysterious sodality of the Pythagoreans had also the goal of uniting the number mystics, those queer people to whom numbers meant the essences of things.[1]

Yet, when investigating in detail, we merely meet with relatively easily understandable endeavors to get at any problem, in experience as well as in hypothesis, from the mathematical and geometrical side and to deal with all problems from this side alone. All this is perfectly clear and transparent and boils down to nothing more nor less than the teaching that there is no truly scientific method outside the mathematical-geometrical method. And if on this account the Pythagoreans are to be called number mystics, then all of us today are number mystics since in this sense all of us today are Pythagoreans. For our acoustics, too, is not a science of tones as such, but of the vibrations on which they depend. Neither is our optics the science of the lights and colors as such, but of those mechanical occurrences on which they depend, and which have been constructed, successively, as emissions or undulations or changes of condition.

True, the Pythagoreans took also great interest in theory of numbers. But this fact does not yet justify calling them number mystics. They were not dealing with these things out of mysteriousness, but because they expected of them valuable support as one never can tell whether one will not be able to make good use of them. Also today, the "highest"

[1] This opinion is still dominant. To Eva Sachs, *e.g.*, (*l.c.*, p. 183), the Pythagorean Society was "ein Geheimbund von Mystikern, die dem Aberglauben der Zahl verfallen sind."

mathematics is that which first for a while cannot be used for anything. Likewise also the Pythagoreans may have dealt with such mathematics as could not yet be applied to practice. Hence also their interest in the various forms of the so-called *tetraktys*.[1]

All this, however, does still not imply that number is "the essence of things."

There is a Philolaos fragment that gives full information about this point. It has been handed down by Theo of Smyrna (106, 10; also Stob. Ecl. I prooem. cor. 3; 44B11) and reads as follows:

The Nature of Number

You must (sc., if you want to get somewhere) look at the performances and the proper meaning (οὐσία) of Number (*i.e.*, of the production-monad), with regard (namely) to the (productive) power which is in the Ten (*i.e.*, which is hidden in the world consisting of ten elements). For it (sc., this power) is great, all-perfecting, all-effecting, the source and leader of divine, celestial, and human life [the rest of the sentence is mutilated] ...

Without this, however, (sc., without this power [in other words: without the mathematical side of things and occurrences]) everything (*i.e.*, any cognition of things and occurrences) (would be) blurry (ἄπειρα) [2] and indistinct (sc., because merely the non-mathematical concomitant phenomenon is followed up) and (in its causal relations) inscrutable (or: veiled in darkness).

For the nature of Number gives knowledge and is leading and teaching for everybody in anything that is to him dubious and unknown. For none of all things would be clear to anybody, neither the own self of a thing nor the self of a thing in relation to another thing, were it not for Number and its deeper meaning.

Actually, however, it (sc., Number) renders all things – in the psyche harmonizing them with sensation – perceptible and mutually measurable by individually embodying, and separating from each other, all the relationships of things, of the unlimited as well as of the limiting ones.

But not only in things superhuman and divine could you watch at work the nature of Number and its power, but likewise in all

[1] *Tetraktys* (τετρακτύς) does not mean the number Four, or *tetras* (τετράς). *Tetraktys* is a designation for the first four members of any series. 1, 2, 3, 4 is only the simplest example of a *tetraktys*. These numbers when added make 10. Therefore, when used without qualification, *tetraktys* means the same as *dekas*, or Ten. But, besides, there is one comprising the first four even numbers, another one consisting of the first four odd numbers, etc. – In the line of number theory, the Pythagoreans have found out some quite nice things, as, *e.g.*, that the differences of the squares form the series of the odd numbers, and the like.

[2] If one wanted to look for the nature of the elements not in the polyhedrons, but to guess it, *e.g.*, from the colors of things, one would forthwith have indistinct color borders merging into one another. In this way, one would not come to causal relations, either.

human performances and relations everywhere and also in all skills of art and in music.

No falsehood is admitted by Number's nature and right proportion: for that does not belong to them. It is to the nature of the indefinite and senseless and unreasonable that falsehood and envy belong.

Number can never even be touched by falsehood: for hostile and hateful to its nature is falsehood, but truth is a thing that is friendly and congenial with Number's kin.

θεωρεῖν δεῖ τὰ ἔργα καὶ τὴν οὐσίαν τῶ ἀριθμῶ κασττὰν δύναμιν ἅτις ἐστὶν ἐν τᾷ δεκάδι· μεγάλα γὰρ καὶ παντελὴς καὶ παντοεργὸς καὶ θείω καὶ οὐρανίω βίω καὶ ἀνθρωπίνω ἀρχὰ καὶ ἁγεμὼν κοινωνοῦσα .... δύναμις καὶ τᾶς δεκάδος. ἄνευ δὲ τούτας πάντ' ἄπειρα καὶ ἄδηλα καὶ ἀφανῆ.

γνωμικὰ γὰρ ἁ φύσις ἁ τῶ ἀριθμῶ καὶ ἡγεμονικὰ καὶ διδασκαλικὰ τῶ ἀπορουμένω παντὸς καὶ ἀγνοουμένω παντί. οὐ γὰρ ἦς δῆλον οὐδενὶ οὐδὲν τῶν πραγμάτων οὔτε αὐτῶν ποθ' αὑτὰ οὔτε ἄλλω πρὸς ἄλλο, εἰ μὴ ἦς ἀριθμὸς καὶ ἁ τούτω οὐσία.

νῦν δὲ οὗτος κασττὰν ψυχὰν ἁρμόζων αἰσθήσει πάντα γνωστὰ καὶ ποτάγορα ἀλλάλοις κατὰ γνώμονος φύσιν ἀπεργάζεται, σωματῶν καὶ σχίζων τοὺς λόγους χωρὶς ἑκάστους τῶν πραγμάτων τῶν τε ἀπείρων καὶ τῶν περαινόντων.

ἴδοις δέ κα οὐ μόνον ἐν τοῖς δαιμονίοις καὶ θείοις πράγμασι τὰν τῶ ἀριθμῶ φύσιν καὶ τὰν δύναμιν ἰσχύουσαν, ἀλλὰ καὶ ἐν τοῖς ἀνθρωπικοῖς ἔργοις καὶ λόγοις πᾶσι παντᾶ καὶ κατὰ τὰς δημιουργίας τὰς τεχνικὰς πάσας καὶ κατὰ τὰν μουσικάν.

ψεῦδος δὲ οὐδὲν δέχεται ἁ τῶ ἀριθμῶ φύσις οὐδὲ ἁρμονία· οὐ γὰρ οἰκεῖον αὐτοῖς ἐστι. τᾶς τῶ ἀπείρω καὶ ἀνοήτω καὶ ἀλόγω φύσιος τὸ ψεῦδος καὶ ὁ φθόνος ἐστί.

ψεῦδος δὲ οὐδαμῶς ἐς ἀριθμὸν ἐπιπνεῖ· πολέμιον γὰρ καὶ ἐχθρὸν τᾷ φύσει τὸ ψεῦδος, ἁ δ' ἀλήθεια οἰκεῖον καὶ σύμφυτον τᾷ τῶ ἀριθμῶ γενεᾷ.

Nowhere in these famous sentences is Number called "the essence of things," *ousia ton pragmaton* (οὐσία τῶν πραγμάτων). Instead, the point under discussion is the *ousia to arithmo* (οὐσία τῶ ἀριθμῶ), "the proper meaning of Number" (not "essence," for *ousia* can here not yet be taken in the sense of the later, Aristotelian technical term [1]), or also "the nature of Number," *ha physis to arithmo* (ἁ φύσις τῶ ἀριθμῶ).

The *ergon*, or performance, of Number is that variety produced by the self-mobile monad, or line, in other words: that extension manifold which is obtained by having the line "originate" from the point, the plane from the line, etc. The *ousia* of Number is the producing unit itself and any other number as well since all numbers consist of units.

[1] To take the use of the word *ousia* for a proof that those sentences are post-Aristotelian involves a *petitio principii*.

And then it says: "Number renders all things perceptible and mutually measurable by embodying all the relationships of things." Hence, it is Number that makes things perceptible. If, however, Number were "the essence of things," then, just the other way round, things would make Number perceptible. But that Number makes things perceptible means clearly the following: Whether anything appears to me as a solid body or as aeriform or as a liquid depends exclusively on the number of planes joining together, and not perhaps on any quality of those planes nor even on their size, but just only on their number.

Number – the Secret of Scientific Progress

All this means properly nothing else but what Kant had in mind when saying that in any science there is only as much of genuine science as can be formulated mathematically. According to Pythagorean view, this is the guaranty of scientific success, there is no scientific method outside the mathematical-geometrical method. This does not mean that number is the essence of things. But it does mean: The essence of number is the secret of scientific progress.

The Pythagoreans obviously started from those musical relations, from the numbers of oscillation and the lengths of strings. They saw that in this way one came to find out the secret of musical composition, of harmony and disharmony. One will therefore penetrate, they concluded, into the secrets of things in general by the same method: by attacking on principle only the mathematical-geometrical side of things.

Even from a psychological view, it would not seem very probable that thinkers with such a decided predilection for geometrical and astronomical problems should have had such a poor formal training as to see in things and occurrences merely the symbolic manifestations of numbers. Presumably, the early Pythagoreans considered some sort of self-production of the geometrical formations, and everything numerically describable, the scaffolding of the world to which everything else was just appended as an accompaniment.

They did not mistake number for the "essence of things." They merely treated the numerically describable side of things and occurrences as the only searchable side and understood all concomitant phenomena, such as tones, colors, warmth, etc., as coordinations which they just called "copies" (μιμήσεις, *mimeseis*) and "images" (ὁμοιώματα, *homoiomata*), expressions obviously taken in a much too literal, naive sense by non-Pythagoreans . . .

CHAMPIONS OF CULTURE POLITICS

Supposing some gruesome catastrophe would bury under debris all achievements of mankind and, similar to the situation after the legendary submersion of the island of Atlantis as described in Plato, a few remnants of humanity would have to climb up again and recover slowly step by step the previous level of culture. Then some historians among that mankind of a far distant future would come across a number of works on botany, written by members of a mysterious fraternity, called "the Jesuits." Those future historians would perhaps arrive at the conclusion that in those olden times before the catastrophe there must have existed a sodality of botanists, the so-called Jesuits, who might also have been somehow interested in religious matters.

It could very well be that classifying the Pythagoreans as philosophers, or even only as scientists, would mean a similar mistake.

What Exactly Were the Pythagoreans?

True, to distinguish in Pythagoreanism two strains, the one more scientific, the other more religious, has become commonplace already. Both were allegedly combined in the person of Pythagoras himself, while soon after the founder's death a dissociation of the two trends took place, resulting in a permanent split between the "mathematicians" and the "acousmatics."

But this hypothesis does not cover all the questions involved. Such dichotomy is much too little and does not seem to be the answer to the problem proper of what exactly those original Pythagoreans of old had been (in contradistinction to the neo-Pythagorean number mystics).

If they were just philosophers – why should a philosopher wear a special garment if he thinks that there are five elements? And if they were merely a religious sect, what has the study of music and geometry to do with religion?

What was the real nature of that mysterious sodality of the Pythagoreans?

The number of authentic facts upon which to build up a plausible hypothesis is very small.

One of the few things we do know is that the Pythagoreans were organized, a strictly organized fraternity. This was not just the sticking together of the members of a school. It was an organization based on authority and subordination. *Autos epha* (αὐτὸς ἔφα), "he himself has said it" (the master, namely) is the ultimate argument. This makes them particularly different from other philosophers. For it is one thing to say that such and such triangles close together to such and such atoms, and quite another thing not to be allowed to deviate. If, then, philosophers at all, they are organized authority philosophers.

There was a downright adoption into their fraternity, after an examination of worthiness and a three years' apprenticeship. Then, if accepted, the candidate was obliged to be, for five more years, a silent disciple who was not allowed to talk and had just to learn and submit himself to the authority of the traditional doctrine. And only then, after the five years of his step by step initiation, he was permitted to talk inside the fraternity, but obliged to keep the doctrine secret to anybody outside. This training in the art of silence, as it were, is exactly the contrast to the art of discussion so cherished among philosophers (from which there is only a tiny step to talkativeness and babbling . . .).

One easily understands why the doctrine was kept secret. As already pointed out, that might have been necessary because the astronomical teachings contradicted popular mythology. So the idea was to avoid persecutions. But that would not yet imply subjection and authoritative organization inside the fraternity.

If the philosophical character has anything to do with development of personality and self-responsibility, then all this is not exactly philosophical. This, as well as their severe self-examination as to whether one had really been following the tradition, is rather priestly than philosophical.

Particularly conspicuous is it that the Pythagoreans always came forward also as politicians, that they were striving for political power. In any city in which they lived, they formed a political party, and an aristocratic party. And as politicians it is indeed that they were fought against and finally exterminated.[1]

[1] The historical facts about the political activity, in Southern Italy and Sicily,

They had, furthermore, definite rules of clothing, strict forms of social intercourse and manners, regulations concerning certain abstinences, and also dietary laws.

Again: such strict organization, reminding of downright monastic discipline, does not seem to belong to philosophy, properly. If philosophers, the Pythagoreans are not only philosophers and not even in the main. Or it may perhaps be still more correct to say that only some of them seem to have been also philosophers.

But what exactly were they? What was the goal proper of the Pythagoreans? What could have been the fundamental idea of Pythagoras himself, the driving vision, the motive for the foundation of that sodality bearing his name?

The Pythagoreans were dealing with astronomy, geometry, arithmetic, acoustics, music, morals, the doctrine of soul transmigration, and also philosophy, and they concerned themselves with physical culture, too, with body posture, with social forms and manners. That seems to indicate that they wanted to get hold of, and support, the whole culture and civilization of their day. They were striving for power, not simply to rule egoistically, but in order to make use of that power for the furtherance of culture. That is to say, they seem to have been nothing more nor less than *political champions of culture*, culture politicians, as contrasted to the champions of a merely legal state, the only aim and purpose of which is protection of property and life.

The Example of the Egyptian Priest

Being politicians, the Pythagoreans had, of course, first of all to establish organization and authority. Now one understands why this was so emphasized.

Being culture politicians, they were naturally also intent on furthering the arts. That they busied themselves quite intensively with music was no accident. And also the cultivation of philosophy belonged no doubt to mental culture.

Yet, as to philosophy, there was involved a certain danger: sometimes philosophy can be destructive, a source of discord and division. And this is something for a political organization to avoid by all means.

It might have been just in order to evade such possibly destructive

of Pythagoras and his followers can now be studied best in the pertinent publications by K. v. Fritz and particulary E. L. Minar, to mention only most recent contributions. (K. v. Fritz, *Pythagorean Politics in Southern Italy*, New York, 1940; Edwin L. Minar, Jr., *Early Pythagorean Politics in Practice and Theory*, Baltimore, 1942.)

effect that the Pythagoreans, or perhaps even Pythagoras himself already, established as a strict rule that it was permitted to philosophize only if one tied the problems to mathematical-geometrical formulation. For then no differences of opinion were possible, ultimately, and so there was a guaranty against disunity. For instance: You may assume as many elements as you like, but you must realize them as geometrically regular bodies. Then, of course, the resulting number of elements can only be 5, just as 2 times 2 is 4 for everybody. In this way, the Pythagoreans could have philosophy and be protected, nevertheless, from discord and disunity.

The Pythagoreans would, then, have been the group of the culture politicians, and their *ultimate goal an education of mankind.*

From such interpretation everything else could easily be understood; above all, the impact on Plato to whom, in turn, so many features of the medieval monastic orders are to be traced back. For culture politics, education of mankind, is exactly also the ideal of Plato, in his older years at least, when he was no longer so close to Socrates and Parmenides, but to Pythagoreanism, instead.

All of that Platonic vision that mankind will arrive at happiness when goodness and wisdom will combine with power – an idea that afterwards, by way of the *Civitas Dei* of St. Augustine, was to have such far-reaching historical consequences –, this hope for the rule of a spiritual minority in the multitude's own very best interest –, all this appears to be just Pythagoreanism in its most genuine and original form.

The decidedly hierarchical character of the Pythagorean organization does not make a very Hellenic impression. It would rather point to an Egyptian pattern, the example of the Egyptian priest who likewise has to be realized as a ruler and master of the whole culture where, of course, also religion belonged. The stories about an Egyptian sojourn of some length of Pythagoras may be considered very trustworthy, it would seem. That conspicuous Pythagorean feature of keeping distance, of being exclusive, stressed and enhanced by the wearing of special garments and obviously going back to Pythagoras himself already, would then also seem to have been adopted from the Egyptian priests with their strict distinction between priest and layman.

Pythagoras and the Indians

An objection sometimes raised against the assumption of an Egyptian origin of Pythagoreanism is that in Pythagoras' time there was in Egypt not yet any belief in soul transmigration. This is true, Herodotus' testimony (2, 123) to the contrary notwithstanding. However, this proves only that that part of the doctrine is not Egyptian.

As a matter of fact, already Barthélemy Saint-Hilaire [1] holds that India is much more likely to have been the source of Pythagoras' doctrine of soul transmigration. And Lucian Scherman mentions,[1] in addition, also the following authors as suggesting that that Pythagorean tenet might stem from India: Friedrich v. Schlegel,[1] Chezy,[1] Dubois,[1] Upham,[1] and Collin de Plancy.[1]

Not only the transmigration of souls, but also some other traits would seem to point to India. This need not be a contradiction, since very well more than one influence could have been at work. There are indeed among the Pythagorean tenets quite a few conformities, and even in baffling details, particularly with the Sâṃkhya philosophy, as has been observed by Jones and Colebrooke already.[2]

Not merely in the form of a brilliant conjecture, but for the first time in a thorough research, Leopold v. Schroeder has called attention to the fact that nearly all the philosophical, religious, and mathematical teachings ascribed to Pythagoras were common knowledge in India as early as the sixth century B.C. In his book, *Pythagoras und die Inder* (Leipzig, 1884), he points out that those teachings arise with Pythagoras without any antecedents and therefrom concludes that the homeland of Pythagoreanism is India. Richard Garbe (*l.c.*) in the main agrees with v. Schroeder concerning this question. They differ only in that v. Schroeder believes Pythagoras was in India itself, while Garbe, with regard to the travel conditions in those times, assumes that Pythagoras met his Indian teachers rather somewhere in Persia.

[1] Jules Barthélemy Saint-Hilaire (1805–1895), *Premier Memoire sur le Sankya*, pp. 512f. and 521f. Lucian Scherman, *Materialien zur Geschichte der indischen Visionsliteratur*, Leipzig, 1892, p. 26, n. 1. F. v. Schlegel (1772–1829), *Ueber die Sprache und Weisheit der Indier*, 1808, p. 111f. A. L. de Chezy, in: Schlegel's *Indische Bibliothek*, I (1823), p. 261. Abbé Jean Antoine Dubois (1765–1848), *Mœurs, institutions et cérémonies des peuples de l'Inde*, II (1825), p. 312f. Upham, *The History and Doctrine of Buddhism, popularly illustrated*, 1829, p. 27f. Collin de Plancy, *Dictionnaire infernal*, Paris, 1818, p. 86.

[2] Sir William Jones (1746–1794), *Works*, London, 1799, III, p. 236. Henry Thomas Colebrooke (1765–1837), *Miscellaneous Essays*, 2nd ed., 1873, pp. 241 and 436.

The main items adduced by v. Schroeder as substantiations of his thesis are: the belief in soul transmigration, with conformities even in details; the prohibition of the eating of beans; the rule not to urinate facing the sun; the pentad of elements; the so-called Pythagorean theorem concerning the rectangular triangle; the irrational number $\sqrt{2}$; and the similarity between the Pythagorean fraternity and religious-philosophical Indian orders of that time.

Yet, however striking and sometimes almost convincing all this may be, one should still not forget that similarity and even likeness are not yet proof of actual transfer. All of this could as well stem from the likeness of human nature. Even the Pythagorean theorem could have independently been found by mathematicians – this at least has not yet been doubted by anybody. Only philologists are always thinking of transfer.

It is, incidentally, an interesting and remarkable, but much too little noticed fact that important philosophers often have a rather scanty knowledge of the history of philosophy (as, *e.g.*, Kant, Spencer, a.o.). It should, therefore, be quite amusing to write some volumes about apparent "relationships" and "influences" which actually never took effect ...

THE GLOSSOMORPHICS

Thus far, we have got acquainted with three different types of philosophers: those bent on bringing about a reform of religion; then the philosophers of nature, with an older group, the Transformists, and a younger group, the Agenetists; and finally the culture politicians.

There is a fourth type, thoroughly different from the others: the Eleatics. The name is merely geographical, indicating that the leading personalities lived in the city of Elea (or Velia) in Southern Italy.

With regard to the geographical meaning of the term and also to certain remarks in Plato, Aristotle, and other ancient writers, it was usual until not so long ago to take Xenophanes for the first "Eleatic." True, he settled in Elea, ultimately, and there was indeed a teacher-disciple relationship between him and Parmenides. But if "Eleatic" is meant in a not purely geographical sense, then the first of the "Eleatics" is not Xenophanes, but Parmenides.

As to Parmenides, there are two schools of thought. According to the one, he is the deepest and sharpest thinker of the pre-Platonic period, if not of all Hellenic philosophy. This is the judgment of the overwhelming majority. According to another, and very small, school of thought, Parmenides means the beginning of an evil that has been spreading ever since and ever more and more and is today still menacing all genuine philosophy with suffocation.

PARMENIDES OF ELEA

(ca. 530–at least 455 B.C.)

"... but, obviously, to think in this way in real life verges on insanity." *

Aristotle.

INTRODUCTION

There are two different versions about the date of Parmenides' birth. The one is based on the notoriously somewhat schematic statements of Apollodorus. According to him, Parmenides would have been born about the same year as Heraclitus. The other version rests on Plato's dialogue *Parmenides* (127B; cf. also *Theaet.* 183E and *Soph.* 217C). Plato's estimate there of Parmenides' age as at best 65 years would suggest that he may have been born somewhat later.

Usually, Plato's remark is brushed aside as just one of those "poetical anachronisms." But H. N. Fowler, in his Introduction to Plato's *Parmenides* (Loeb Classical Library, London, 1926) and also F. M. Cornford, in his *Plato and Parmenides* (London, 1939), taking Plato's words seriously, assume the birth date of Parmenides as "not far from 514 B.C." (Fowler) or "about 515 B.C." (Cornford).

There is indeed no good reason for disregarding, as mere fancy, Plato's description of young Socrates' meeting with Parmenides. True, when it says that at that time Parmenides "was already very old" (εὖ μάλα ἤδη πρεσβύτην εἶναι), "with entirely gray-white hair" (σφόδρα πολιόν), "yet with a beautiful and noble face" (καλὸν δὲ κἀγαθὸν τὴν ὄψιν), "about, at the highest, 65 years" (περὶ ἔτη μάλιστα πέντε καὶ ἑξήκοντα), it does certainly not imply that the "extremely young" Socrates (σφόδρα νέον) had bluntly asked the awe-inspiring guest to tell him his exact age. Hence, of course, that description could fit a man of 65 just as well as one of 70 or 75.

* ... ἐπὶ δὲ τῶν πραγμάτων μανίᾳ (sc., δοκεῖ) παραπλήσιον εἶναι τὸ δοξάζειν οὕτως. *De gen. et corr. I 8. 325a13 (28A25).*

Accordingly, I am inclined, heeding Plato's estimate, to assume that Parmenides was born some time around 530 B.C. In combination with 533 B.C. as the birth date of Anaxagoras, this would mean a welcome support of my conviction that those time-honored assertions about an alleged influence of Parmenides on Anaxagoras and about the system of Anaxagoras being a "compromise" construction, prompted by Parmenides' "remorseless logic" (Cornford), are rather unsubstantial and illusive.

Formative Influences

Ancient tradition has it that there were two influences at work in the mental development of Parmenides.

He is said to have become a full-time disciple (διήκουσε) of Xenophanes, but then did not embrace his doctrine (Diog. Laert. IX 21; 28A1). At the same time, however, he attached himself also (καί) to a member of the Pythagorean Fraternity of Elea, a man by the name of Ameinias Diochaites. And, according to Sotion (ap. Diog. Laert., *l.c.*), it was by this man, and not by Xenophanes, that Parmenides "was given peace of mind" (εἰς ἡσυχίαν προετράπη).

This way of putting it is somewhat striking. What does that mean? It does not seem to refer to mere theory, but rather to a pacification of the emotionally restless mind of a youngster yearning for a tranquillizing way of life. Apparently, the cool loftiness of Xenophanes' doctrine did not appeal to Parmenides. But the purity and integrity, the mildly ascetic Pythagorean way of life of a poor, but noble and friendly man such as this Ameinias (ἀνδρὶ πένητι μέν, καλῷ δὲ κἀγαθῷ) did have that emotional appeal, as one easily understands. Presumably, this man was not even a scholar, but perhaps just one of those "common members," or "auditors," of the fraternity who belonged "largely to the lower classes." [1]

Parmenides' friendship with this humble Pythagorean must have had a great and durable impact on the formation of his personal life. And when there is mention of a "Pythagorean and Parmenidean way of life," [2] it obviously means that Parmenides adopted the Pythagorean way of life for his own life practice.

[1] Cf. E. L. Minar, *Early Pythagorean Politics in Practice and Theory.* Baltimore, 1942, p. 31.

[2] Cebes Tab. 2; Strabo 6, 1, p. 252; Proclus, In Parm. 4, 5 Cousin; cf. Minar, *l.c.*, p. 40.

In the years of his mature manhood, or even later, Parmenides provided for Elea "excellent laws" (νόμοι ἄριστοι), as is related by Diogenes Laertius and others. This, too, may have had something to do with the good influence of the memory of that Pythagorean friend, the guide of his adolescence.

Yet, all that need not have any connection with theory. Nor does it imply that Parmenides ever became an initiate of Pythagoreanism. It does not even imply that that man Ameinias himself belonged to the inner circle of the "elect."

Two Cases of 'ignotum per ignotius'

If this relationship to Ameinias is supposed to be the "evidence that he" (sc., Parmenides) "had broken away from the Pythagorean school" (Cornford, *l.c.*, p. 1), then the "evidence" is not exactly cogent.[1]

Nevertheless, Cornford and one of his disciples, Mr. Raven, have both taken as the fundament and starting-point of their respective constructions the rather questionable assumption that Parmenides is but "a dissident Pythagorean."

But there is a difference. Cornford holds that

> the remarkable features of Parmenides' system will become intelligible only when we see his poem as a protest against the fundamental assumptions of the earlier systems which he is concerned to criticize and reject ...

and that, as a dissident Pythagorean,

> he would ... be likely to define his own position mainly in contrast with theirs. (*l.c.*, p. 1)

Mr. Raven, however, goes just the opposite way:

> Parmenides, being a dissident Pythagorean, would be eager to criticize Pythagoreanism,"

he says. And this is then to Mr. Raven the clue for a reconstruction of

[1] The report about the relationship to Ameinias is the only thing to be taken seriously. It stems from Sotion whose *Diadoche* was written between 200 and 170 B.C. But Strabo's calling Parmenides and Zeno "Pythagoreans" (ἄνδρες Πυθαγόρειοι) – Strabo's time is 63 B.C. to 20 A.D. –, Proclus' (5th century A.D.) assertion that Parmenides and Zeno "were attending the Pythagorean school" (τοῦ Πυθαγορείου διδασκαλείου μεταλαβόντε), and Photius' (9th century A.D.!) remark that Parmenides and Zeno "belonged to the Pythagorean school" (τῆς Πυθαγορείου ἦσαν διατριβῆς) are obviously of no primary value as evidence.

what he calls "pre-Parmenidean Pythagoreanism" in his monograph on *Pythagoreans and Eleatics* (Cambridge, 1948).

So the one of the two scholars wants to understand Parmenides from Pythagoreanism, the other wants to find out the tenets of Pythagoreanism by inference from their alleged criticism by Parmenides.

Neither of these contradictory specimens of *ignotum per ignotius* does appeal to us. It appears to be much simpler and much more promising just to listen carefully to what Parmenides himself has to say – yet, without twisting and screwing his words and without squeezing into them any contents they do not contain ...

Parmenides' Philosophical Poem

Following the example of Xenophanes, Parmenides wrote his philosophy in verse, giving it the form of a poem. But whether there is much of real poetry in his hexameters could justly seem doubtful. As a matter of fact, already in antiquity his poem was characterized as "more prosaic than poetic." [1] And Aristotle's vitriolic remark about Empedocles' verses that the only thing common with Homer was the metre could certainly apply to Parmenides as well.

The poem – of which more than 150 verses have survived – consists of three sections: an allegorical introduction; a first part, containing Parmenides' philosophy proper; and a second part, meant to give the reader a summary of "the beliefs of the mortals" which, however, are utterly wrong and have no rightful place in the realm of Truth, according to Parmenides.

This last part is interesting from the standpoint of the philologist, the historian of literature, and even the historian of Greek philosophical literature, but not exactly from the standpoint of the historian of philosophy. Accordingly, we are going to follow the hint implied in Parmenides' own classification and want to interest ourselves in that part only which is supposed to contain what to Parmenides is the philosophical Truth.

PARMENIDES' 'TRUTH'

Parmenides' philosophy proper begins with an existential sentence without a subject:

[1] Proclus, In Parm. I p. 665 (28A18): ... ὥστε μᾶλλον πεζὸν εἶναι δοκεῖν ἢ ποιητικὸν <τὸν> λόγον.

There is.

ἔστιν.

fr. 2,[1] 3.

Then follows, in the same line, a second existential sentence:

There is no not-being.

οὐκ ἔστιν μὴ εἶναι.

ibid.

The analogy of the two sentences shows that the grammatical subject of that first sentence is εἶναι (*einai*), or "to be," "being," just as the grammatical subject of the second sentence is μὴ εἶναι (*me einai*), or "not to be," "not-being." Consequently, the brachylogical first sentence, when given its complete form, means:

There is being.

ἔστιν εἶναι.

This alone already is highly characteristic. Parmenides does not start, say, with the necessity of a belief in only one god or something about the origin of the world or so. He begins, instead, with certain propositions that could be validly stated even if there were no world at all.

Parmenides, namely, is a deducing philosopher, the first "rationalist" of antiquity. "He is the first philosopher to argue, formally deducing conclusions from premisses, instead of making dogmatic announcements" (Cornford, *l.c.*, p. 29).

An Ancient 'Cogito, ergo sum'

Accordingly, the sentence, "There is being," is then substantiated. This substantiation amounts to something like an ancient *cogito, ergo sum:*

Thinking = Being.

τὸ γὰρ αὐτὸ νοεῖν ἐστίν τε καὶ εἶναι.

(literally: "For thinking and being is the same.")

fr. 3.

[1] According to the new and very plausible arrangement of the fragments by Kranz. – An additional rearrangement by Rosamund Kent Sprague appears likewise worthwhile adopting. According to her suggestion (*Class. Philol.*, April 1955, pp. 124–126), frr. 6, 7, and 8 would have to be arranged as follows: 6,2; 7,1; 6,3–9; 7,3. 7,2 would have to be deleted.

Just as any equation, also this one can be transformed into two sentences with copula construction:

Any thinking is being,
any being is thinking.

The second of these propositions is rather objectionable, though. But we do not need it. The first proposition, however, when used as the major premisse of a syllogism, leads to this result:

(1) Any thinking is being.
(2) There is thinking.

---

(3) There is being.

The basic idea is, then: "Being is." This is evident from the outset. It is, so to speak, an *a priori* valid proposition.

All the philosophers we have dealt with so far start from some sense-given impression, some experience, and then develop that. Parmenides, however, begins with the fundamental law of thinking, the principle of identity. True, that law was not yet formulated as such at his time. But he operates with it. Neither was yet in existence at his time any theory of syllogism. But first there is syllogism, and only later comes the theory of syllogism, just as first there is language, while only afterwards comes grammar.

Thus, Parmenides declares that being is. That is perfectly clear, of course. For to say that being is not would certainly be just as absurd as to say that A is not A. Hence: Being is, not-being is not. That is merely an application of the principle of identity, "A is A." It is completely obvious. It does not sound particularly world-shaking, though. But it may without ado be admitted.

The second proposition, "There is no not-being," is substantiated by the principle of contradiction. "Being is, not-being is not" is correct. But "Being is not and not-being is" [1] makes no sense. For the not-being cannot be, and the being cannot not be, since something cannot be and not be at the same time:

[1] . . . ὡς οὐκ ἔστιν (sc., εἶναι) τε καὶ ὡς χρεών ἐστι μὴ εἶναι.
. . that (sc., being) is not, and not-being is allowed to be.

fr. 2, 5.

> For the not-being you could neither think (for this is unfeasible) nor [even] say.
>
> οὔτε γὰρ ἂν γνοίης τό γε μὴ ἐόν (οὐ γὰρ ἀνυστόν)
> οὔτε φράσαις. *fr. 2, 7.*

Such nonsense could neither be thought nor said. It could merely be babbled.[1]

If that were all, nothing could possibly be said against such rather insignificant, not to say boring, truisms.

The Destruction of a World

However, although these truisms would not sound world-shaking at all, Parmenides did manage to shake, nay, even to destroy, the whole world of occurrences by their use. Or, at least, that is what he believed he did when eventually rejecting as "a (mere) name," as empty words that is, "all that the mortals have established, believing it to be true." [2]

From the proposition, namely, that there is no not-being, Parmenides has developed a whole philosophy.

Cornford is right. Yes, Parmenides is indeed "the first philosopher to argue, formally deducing conclusions from premisses." True, there was not yet in Parmenides' day the methodical, scholastic form of the verbal expression of syllogisms. But there were, of course, the syllogisms themselves, behind, or underlying, or involved in, the quasi-poetical wording of the Parmenidean verses.

In order to render things clearer and more drastic, we are now going to carve out that implied reasoning and give it the form of modern syllogisms. Translating the Parmenidean "Way of Truth" into prose, as it were, we shall ever and ever repeat the proposition, "There is no not-being," as the major premisse of a number of syllogisms, while the minor premisses vary:

(1) There is no not-being.
(2) Becoming is an initial not-being.

---

(3) There is no becoming. (fr. 8, 40)

[1] φράζειν, "to say something (meaningfully)." The contrast would be λαλεῖν, "to babble."

[2] . . . πάντ' ὄνομ(α) ἔσται, ὅσσα βροτοὶ κατέθεντο πεποιθότες εἶναι ἀληθῆ . . . *fr. 8, 38.*

(1) There is no not-being.
(2) Perishing is a final not-being.

---

(3) There is no perishing. (fr. 8, 40)

(1) There is no not-being.
(2) Changing of place is an initial there not-being.

---

(3) There is no changing of place. (fr. 8, 41)

(1) There is no not-being.
(2) Changing of color is an initial differently colored not-being.

---

(3) There is no changing of color. (fr. 8, 41)

(1) There is no not-being.
(2) Having been is a now not-being.

---

(3) There is no having been. (fr. 8, 5)

(1) There is no not-being.
(2) Future being is a now not-being.

---

(3) There is no future being. (fr. 8, 5)

As there is no past and no future, it follows that being has neither a beginning nor an end in time. For the one would have to be in the past and the other in the future:

> But, unmoved within the limits of big chains, it is there, without beginning and without an end.
>
> αὐτὰρ ἀκίνητον μεγάλων ἐν πείρασι δεσμῶν ἔστιν ἄναρχον ἄπαυστον . . .
> *fr. 8, 26.*

Being Has Neither Quality Nor Intensity

All not-being having been done away with in this manner, the question arises: What is left for the being?

At least, of course, the five letters of the Greek infinitive present tense *einai* (εἶναι, meaning "to be," or "being"). But what else?

What about timeless space, together with a rigid configuration as its filling? Could that belong to being? Such rigid configuration would, after all, neither take origin nor perish nor change nor move.

Yet, the idea of identifying being with a configuration filling the world space has to be dropped forthwith. For Parmenides says that

> (the being) is not distinguishable either ...
>
> οὐδὲ διαιρετόν ἐστιν ...
>
> *fr. 8, 22.*

There are supposed to be no differences of quality and no differences of intensity in the space of the universe. The filling of the space of the universe is supposed to be perfectly homogeneous.

Underlying that are again those stereotyped syllogisms:

(1) There is no not-being.
(2) Something red is a green not-being.
―――――――――――――――――
(3) There is nothing red.

But the same applies to any other quality alike. For since something green is a red not-being, there is nothing green, either. And so, such filling is homogeneous not in the sense of having only one certain quality and one certain degree of intensity, but in the sense of having no quality or intensity at all.

Therefore, purified from any not-being, genuine being has neither quality nor intensity, and there is only one *Einai*, identical "everywhere in space."

Space, Too, Is a Not-Being

But if being is supposed to be undistinguishable, how can it have any local differences? Though having neither quality nor intensity, by local differences it would become distinguishable (and, in imagination, divisible [1]), nevertheless.

It is not without some reason that in the preceding paragraph the words "everywhere in space" are between quotation marks. Strictly speaking, namely, just as time, also space, empty, timeless space, belongs to the Parmenidean not-being:

Take, for instance, the space of the universe and within that space a small globe. This globe has only one here being and an infinity of there not-being. Any there not-being, however, is a case of not-being in general, and there is no not-being. If, therefore, we disregard that senseless not-being, then what is left is that small globe alone without its surroundings. But within itself that ball has still some space. Now, of that ball one can distinguish two halves. The one half has its own here being and the there not-being. If you want to free that semiglobe from the nonsense of being and not-being at the same time, you must

[1] διαιρετός (*diairetos*) means both "distinguishable" and "divisible."

eliminate the other semiglobe. But then comes again the same difficulty with the quarters of the ball, and so the labor of purification from nonsense will continue until all space is gone.

Consequently, also space belongs to the not-being. In other words, empty space, just as time, is one of those deceptions. The *Einai* is only one and the same, and not perhaps merely equal, "everywhere" in that not-being space. Which is to say: That being allegedly stretches in space, this, too, is a delusion.

The Ball Metaphor

Yet, to all appearances, Parmenides was shy of being blunt and outspoken about this consequence, obviously out of respect for Old Xenophanes, his former teacher.

Xenophanes' One-and-All that everywhere was seeing and thinking and hearing and without exertion governing all events did have the shape of a ball. Parmenides, however, had ultimately felt he could not embrace this doctrine. He felt he was able to make it into something much more profound. To him it was to become a doctrine about a timeless as well as spaceless being that was thinking – and only thinking – itself.

But to avoid openly contradicting his old teacher, in order to express his own idea as inoffensively as possible, Parmenides resorted to reducing the spherical shape of the One-and-All to a metaphor, a simile: Just as the points of the surface of a ball have no differences in their distances from the centre, so in being there are no differences of quality or intensity or place, for there is only one *Einai:*

> But as there is an ultimate limit, it (sc., the being) is perfect from all sides, comparable to the curvature [1] of a well-rounded ball, equal from the middle towards everywhere: for it (sc., the being) must neither in any respect (τι) be larger nor in any respect be smaller here or there.
>
> αὐτὰρ ἐπεὶ πεῖρας πύματον, τετελεσμένον ἐστί
> πάντοθεν, εὐκύκλου σφαίρης ἐναλίγκιον ὄγκῳ,[1]
> μεσσόθεν ἰσοπαλὲς πάντῃ· τὸ γὰρ οὔτε τι μεῖζον
> οὔτε τι βαιότερον πελέναι χρεόν ἐστι τῇ ἢ τῇ.
>
> *fr. 8, 42–45.*

[1] There are two ὄγκος in Greek. The one means "mass," the other means "curvature." In this passage, "curvature" makes good sense, whereas "mass" would be rather void of meaning. (Diels, Kranz, K. Freeman, a.o., take ὄγκος as "mass.")

That is to say: Just as the ball has a limiting surface, so the being, too, must have a limit. For otherwise it would be a limited not-being. And just as the surface, closed in itself, of the ball is complete in itself, so the being is complete in itself. For

> . . . the being must not be uncompleted.
>
> . . . οὐκ ἀτελεύτητον τὸ ἐὸν θέμις εἶναι.
>
> *fr. 8, 32.*

The *Einai*, then, cannot be space because just there is no space as something thinkable. That delusion which we call "space" is merely a metaphor for the genuine being.

Those "limits" of being are no geometrical limits. They are grammatical limits. But they are well comparable to the geometrical ones as to their strictness. You can exactly predicate of anything whether it belongs to the being or the not-being. Any occurrence belongs to the not-being. The seeing of the occurrence belongs to the not-being. Thinking – in so far as being is the object of thinking (νοεῖν) or thought (νόημα) – belongs to the being. With the same strictness is a point either in or outside or inside the surface of a ball.

Being merely *fills* the seeming space. It is omnipresent *in* the seeming space. It is not that space itself,

> but the (space of the) universe is *full* of the being. It is in this way that the universe is "continuously" filled: to wit, being "meets" *itself*.[1]
>
> πᾶν δ' ἔμπλεόν ἐστιν ἐόντος.
> τῷ ξυνεχὲς πᾶν ἐστιν· ἐὸν [1] γὰρ [2] ἐόντι [1] πελάζει.
>
> *fr. 8, 24.*

And undistinguishably "equal everywhere" is that space-filling just because there is no space at all, properly, but only the one identical being, with the mere seeming of spatial plurality or dividedness.

If for no other reason, being cannot be identical with space because being is identical with thinking, according to Parmenides. Of space you cannot say: it thinks. You can only say: space is extensive. Concerning that real, however, which is filling the seeming space, one can say indeed that it thinks.

[1] ἐόντι is reflexive to ἐόν, therefore: "meets *itself*." There is no plurality of ὄντα, according to Parmenides, one must not forget.

[2] The use of γάρ in the sense of an explanatory "to wit," "namely," is particularly frequent after demonstrative pronouns (in this case τῷ) announcing an explanation (see any school dictionary).

In the seeming space, there is a seemingly omnipresent, but actually spaceless thinking. And being just is that thinking.

A Strange Misinterpretation

As has been shown, it is with great circumspection and discretion that Parmenides, avoiding being bluntly outspoken, has expressed his deviation from Xenophanes. As a consequence, that deviation has mostly not even been noticed.

In his *Theaetetus*, Plato mockingly (but still correctly) mentions

> all that those Melissusses and Parmenidesses . . . solemnly declare: that all things are One, and that this stands in itself since *it has no space* in which to move.
>
> ὅσα Μέλισσοί τε καὶ Παρμενίδαι . . . διισχυρίζονται, ὡς ἕν τε πάντα ἐστὶ καὶ ἕστηκεν αὐτὸ ἐν αὑτῷ οὐκ ἔχον χώραν ἐν ῇ κινεῖται.
>
> *Theaet. 180E (incompletely, mutilatedly, and wrongly [180D] quoted by Diels [introd. to fr. 8] and Kranz [introd. to fr. 7 and 8]).*

But in his *Sophistes*, Plato believes himself to have found out:

> If, then, (the being) is whole, as also Parmenides declares that it is
>
> "from all sides like the curvature of a well-rounded ball, equal from the middle towards everywhere; for it must neither in any respect be larger nor in any respect be smaller here or there," –
>
> if, then, it is such, the being has a middle and limits; if, however, it has these, then there is all necessity that it have parts.
>
> εἰ τοίνυν ὅλον ἐστίν, ὥστε καὶ Παρμενίδης λέγει,
> πάντοθεν εὐκύκλου σφαίρης ἐναλίγκιον ὄγκῳ,
> μεσσόθεν ἰσοπαλὲς πάντῃ· τὸ γὰρ οὔτε τι μεῖζον
> οὔτε τι βαιότερον πελέναι χρεόν ἐστι τῇ ἢ τῇ,
>
> τοιοῦτόν γε ὂν τὸ ὂν μέσον τε καὶ ἔσχατα ἔχει, ταῦτα δὲ ἔχον πᾶσα ἀνάγκη μέρη ἔχειν.
>
> *Sophist. 244E. (In the quotation by Diels and Kranz [introd. to fr. 8], the very point Plato makes, his conclusion at the end of the sentence, has been suppressed.)*

And after a few more lines, Plato decides:

> No doubt, then, according to correct speech, it must be said that what is genuinely One has no parts at all.

> Ἀμερὲς δήπου δεῖ παντελῶς τό γε ἀληθῶς ἓν κατὰ τὸν ὀρθὸν λόγον εἰρῆσθαι.
>
> *ibid., 245A.*

But – as a matter of fact, Parmenides by no means says that the being is a ball. He says that it is "something comparable (ἐναλίγκιον) to the curvature (not "mass"!) of a well-rounded ball." And what is merely comparable to a ball is not itself a ball.[1]

In what respect, however, the being is comparable to a ball, this is clearly stated. To say it again: Just as all the radii of a ball are of the same length towards any point of the surface, so are all the parts of the (seeming) space equally filled with the same thinking being.

Yet, this being itself has neither a centre nor a surface nor radii. It is not extensive at all. It is *inextensive, uncorporeal thinking that is present whole and undivided in each and every part of the seeming space.* For the plurality of points of space and parts of space belongs to the irrealities.

That consequence, therefore, which Parmenides ought to have drawn according to Plato, has been actually drawn by Parmenides himself. To him, the one being was timeless and spaceless as well, filling the seeming time and the seeming space. The one being was the whole of being and all being, not, however, the whole of the world-sphere, but the "omnipresent" filling of the form of the (unreal) world-sphere.

No Division of Consciousness

All that belonged to not-being having been eliminated – among which was also space –, the only thing left to Parmenides was *thinking*, either in the sense of *noein* (νοεῖν, "thinking") or of *noema* (νόημα, "thought"). Would that be possible?

Being thinking is thought not-being. Being thought is thinking not-

[1] Already Eudemos, as relates Simplikios (Phys. 143, 4), rejected the opinion of those misinterpreting the words "comparable to the curvature of a well-rounded ball" as allegedly referring to the world-globe:

> For the celestial vault is not "undistinguishable." However, it is not "similar to a ball," either, but is itself a ball, (and even) of all (the balls) in nature the strictest.
>
> οὐ γὰρ ἀδιαίρετος ὁ οὐρανός, ἀλλ' οὐδὲ ὅμοιος σφαίρᾳ, ἀλλὰ σφαῖρά ἐστιν ἡ τῶν φυσικῶν ἀκριβεστάτη.
>
> *Introd. to fr. 8.*

Eudemos' rejection applies also to the misinterpretation of the passage by Burnet (EGP p. 178), Cornford (*l.c.*, p. 44), and others.

being. Consequently, there is neither being thinking nor being thought. But then there is nothing at all. And we just have to stop talking.

Yet, there is that proposition, "Being is" (ἔστιν εἶναι), and this proposition stands firm, doesn't it?

The argumentation, therefore, runs as follows: If, on the one hand, being is, on the other hand, thinking is not, and then thought is not, either, then, *consequently, the sentences, "Thinking is thought-not-being" and "Being thought is thinking-not-being," must be false.* This is an indirect demonstration. For with the assumption that thinking is thought-not-being and viceversa, we arrive both ways at nonsense: the nonsense, namely, that there is neither this nor that. It is, therefore, indirectly proven that the proposition, "Thinking is thought-not-being and vice-versa," is false. What follows therefrom?

It follows that *both are identical:*

> Thinking and the object of thought are the same.
>
> ταὐτὸν δ' ἐστὶ νοεῖν τε καὶ οὕνεκέν [1] ἐστι νόημα.
>
> *fr. 8, 34.*

For if the two are not identical, then the one is not the other, and then there is neither the one nor the other. Yet, there is indeed being, for "Being is" is irrefutable. Those propositions, consequently, are false. Therefore, what is left must be true, and that is: Thinking and thought are identical, since thinking is identical with being (τὸ γὰρ αὐτὸ νοεῖν ἐστίν τε καὶ εἶναι [fr. 3]).

Thus, the only being is consciousness, *noema*, that, however, must not be split into act of thinking and content of thinking, or else one comes to nonsense. In other words, Parmenides rejects the division of consciousness in act and content.

That this is to be found in antiquity already is interesting indeed. We are used to be told that consciousness can be distinguished into the acts of imagining, thinking, seeing, hearing, etc., and the contents, and that seeing is different essentially from the seen, hearing, from the heard, etc., in general, the psychical act, from the consciousness content. Parmenides, however, would say this is not true, for consciousness is strictly undivided, and such division is merely *façon de parler*.

Well, one could agree to that. It is not a bad idea at all. Conscious-

[1] οὕνεκεν means here "concerning which," not "for the sake of which," of course. I read, with Diels, οὕνεκέν ἐστι. The change by Kranz into οὕνεκεν ἔστι, meant to support his meaningless translation, "Dasselbe ist Denken und der Gedanke, dass IST *ist*," betrays the philosophical helplessness of the philologist.

ness does seem to be strictly undivided, and that distinction does seem to be just a phrase.[1]

Those Alarming Consequences ...

But something else is here alarming: It has now allegedly been proven that there is no becoming, no perishing, no change of place, no change of quality, no past or future as different from present. This is startling indeed.

For the first time, we have now come across something that contradicts experience. By all those other philosophers, we are told things we may or may not believe, as, for instance, how many elements there are, things one may or may not go along with, hypotheses that could be constructed one way as well as otherwise. But here it is different. For either those demonstrations of Parmenides are wrong or they are correct and our whole consciousness is crazy.

Not-being is not. That is correct. Becoming is not being, *ergo* it is not. There is no mistake in that argumentation. Those syllogisms are irrefutable.

One might say: I just do not believe it, and I shall not allow myself to be confused by that. And this is indeed the normal reaction of common sense. But it is not the answer of a trained philosopher.

Well, the answer to Parmenides' "remorseless logic" (Cornford) is not so easy.

THE TRUTH ABOUT PARMENIDES' "TRUTH"

All those Parmenidean syllogisms are no syllogisms at all. They are merely a sum of words.

The Possibility of Talking without Thinking

What we are facing here is a phenomenon of fundamental importance: the possibility of talking without thinking. Exactly this is the characteristic feature of *glossomorphism.* Here we have that type. Parmenides is the purest example of that kind of philosophy.

"Glossa" means "language." *"Morphé"* means "form," "outward appearance." Ordinarily, our language is an expression of thoughts. In this case, it is *glossa*. One has spoken. One has said something. However,

[1] Cf. also p. 441. Incidentally, this undividedness is also to be found with Plato. For who, after all, is thinking the Platonic Ideas? They are thinking themselves, with no distinction possible of "subject," "act," and "object."

the words we speak tend, and are destined, to substitute for imaginations. For if a person were perpetually to imagine all that he hears or speaks, he would get virtually insane, just as if he were to live with hallucinations all the time. That is why, ordinarily, one does not imagine.

Yet, every once in a while, whenever, for instance, it becomes necessary because you get stuck or confused somehow, you stop speaking, you let imaginations enter again, and you begin thinking. But as long as everything is running smoothly, a word substitutes for an imagination, and a concatenation of words, for a concatenation of imaginations. And that is nothing inferior, but rather a wonderful provision of nature.

However, it can also happen that the mill runs empty:

The movements of speech are a purely motory forth-conduction of stimuli. First we speak, and then we hear ourselves speaking. Now, the imagination stimulus is difficult [1] and, as a matter of fact, is easily overpowered by speaking, gesticulating, or writing.[2] For all the motory stimuli are in a relationship of mutual competition, though, but they are – and even each of them can be – stronger than the imagination stimulus. The motory stimuli, therefore, have a tendency of hampering the imagination stimulus. Thus, in almost every human being the speech mechanism is virtually bound to run empty once in a while. This is quite natural.

But when developing ever more and more, it can of course become pathological, resulting in a complete choking up of imagining by talking. Which then is an overgrowth of actually empty speech movements that cannot be translated into imaginations at all. True, this is not pathological in the medical sense of the term. It does not hurt. It is not exactly detrimental to a person's health. It does not effect a shortening of life. Yet, it does signify some atrophy, some sort of partial idiocy, the beginning of mental derangement.

Sometimes, however, such idiotic babbling can deceptively assume the form (*morphé*), the outward appearance, of real speech. Such babbling is not genuine *glossa* any more, but merely *glossomorphic*. And he who is stricken by glossomorphism [3] is then a man who has gone glossomorphic.

[1] Cf. A. Stöhr, *Psychologie* (2nd ed., Vienna, 1922), Part VII, chapt. 73 (*Zusammenhang des motorischen mit dem vorstellenden Gedächtnis*), pp. 305–313.
[2] People who write and speak nicely use to have trouble in imagining.
[3] Cf. A. Stöhr, *l.c.*, Part VIII, chapt. 133 (*Die "Glossomorphie"*), pp. 444–446.

That thing can become progressively malignant. There are all transitions from mild glossomorphism to what in psychiatry is called verbigeration. The pie of nonsense tends to grow bigger and bigger and, given a certain talent, can develop into a whole philosophy.

That glossomorphism is something pathological has not yet been found out generally. Physicians, namely, occupy themselves too little with philosophy, and philosophers occupy themselves too little with medicine, ordinarily. As a consequence, physicians miss the opportunity of becoming alive to that phenomenon, whereas normal philosophers usually have no inkling of the fact that among their fellow-philosophers there are soandso many percent mentally ill people. And yet, it might indeed be not unjustified downright to distinguish normal and abnormal philosophers. True, one need not agree with the late Austrian philosopher Richard Wahle who, in two big volumes,[1] has tried to demonstrate that of all philosophers one hundred percent are babblers and crackpots. This is no doubt a gross exaggeration. But it might be rather right to follow Adolf Stöhr who used to maintain that the correct estimation should be only about ninety percent.

Glossomorphic people can even be very witty and brilliant – outside the localization of their glossomorphism when they are made to change the topic.

For there is indeed always some localization, as it were, a certain fixation, a fixation to some fixed word. With Parmenides, the word around which he is fixedly spinning is *einai*.

There is another pathological symptom in Parmenides: he gets angry about all those who would not agree. There appears to be indeed some slight kinship between glossomorphism and paranoia. Hence Parmenides' invectives against the others whom he calls "deaf and blind" (κωφοὶ ὁμῶς τυφλοί τε [fr. 6, 7]), "blockheaded idiots" (τεθηπότες [*ibid.*]), "a multitude without judgment of their own" (ἄκριτα φῦλα [*ibid.*]), and "ignorants" (εἰδότες οὐδέν [fr. 6, 4]).

The Undoing of the Parmenidean Paralogisms

According to Parmenides, there is only *einai*, the *einai* that is thinking itself. The thinking *einai* is identical with the thought *einai*, and that is what there is. All that is neither thinking nor being is

[1] R. Wahle, *Das Ganze der Philosophie und ihr Ende. Ihre Vermächtnisse an die Theologie, Physiologie, Aesthetik und Staatspädagogik* (Vienna, 1894), and *Die Tragikomödie der Weisheit. Die Ergebnisse und die Geschichte des Philosophierens* (2nd ed., Vienna, 1925).

relegated into irreality. All that cannot be signified by the expressions *einai* ("being"), *estin* ("is"), and *noema* ("thought") will be an empty word. There is nothing to it. It is nothing thought, no object of cognition. It is a seeming that cannot be comprehended by means of the intellect. It can merely be sensed, done, suffered, loved, hated, but not thought. Being alone thinks, and being alone can be thought:

> A (mere) name will be all that the mortals have established, believing it to be true.
>
> πάντ' ὄνομ(α) ἔσται,
> ὅσσα βροτοὶ κατέθεντο πεποιθότες εἶναι ἀληθῆ . . .
>
> *fr. 8, 38.*

Yet, properly just the opposite is true. While Parmenides believes that everything else is mere words and his *einai* is the sole true thing, exactly what he says turns out to be mere words.

This is funny to a small extent only. In the main, however, it is a terribly serious matter. It shows that language wields a frightful sway over man unless it is seen through. Parmenides' "remorseless logic" was good for nothing because before logic would have had to come a study of grammar. In the day of Parmenides a reasonable grammar was not yet in existence. That is why it was not yet feasible to disclose his conclusions as paralogisms.

When saying, οὐκ ἔστι μὴ εἶναι, "There is no not-being," Parmenides operates with the word μή, "not," and the word εἶναι, "being."

"Not" is no name. It is a grammatical sign of operation and is in need of a name as a supplement, as, *e.g.*, "not-A." This then signifies, in a so-called negative form, something positive, as, for instance, "B." To use "not" alone, without the addition of any name, would be comparable to writing the sign of radication $\sqrt{\quad}$ without putting into it any quantity to operate with.

The other word used by Parmenides is *einai*, "being." Now, what exactly is this famous, self-thinking, alone genuinely being *einai* anyway, this *einai* that *is*, while everything else is not? What is it, properly? What are its correspondences in language types other than the Indogerman one?

This *einai* is an infinitive, consisting of a logically functionless stem and a likewise logically functionless ending.

True, it was not always so. Originally, in that prehistoric time, with its panzoistic *Weltanschauung*, when the primordial Indogerman

language was taking origin, the stem of that verb did have a meaning. It meant "to live," "to do, or suffer, living," and the like. For then

> any sense-given reality was taken for the manifestation of a wilful doing or a felt suffering or a self-movement or self-changement of something conscious of itself. Because of this human empathy, the naming of any real occurrence was also the naming of life. Everything real was considered living, and only the living was real. The notion-makers for "real" and for "living" were identical. . . . On a later level, when there is already a distinction of living and lifeless, "real" is not considered the same any more as "living," and for the notion of being is left only the "being real" which then, later on, splits into the notion of the real in the narrower sense, or "*Dasein*," "reality," and that of the real in the broader sense of also being merely thought or even of being merely spoken. . . . To this division into the narrower and the broader fields of the real corresponds a difference in accentuation. If the narrower field is meant, the verbal stem of "being" has to be emphasized: A *is* = A is *real*. If the verbal stem is not accentuated, if one says: A is B – when the reality or, also, the irreality (with merely conceptual operations) or the being unknown of the reality (in the narrower sense) is presupposed –, then the verbal stem of "being" becomes a meaningless carrier of the conjugation endings, a mere copula. Therefore, the indicative (present tense) of the copula is dispensable and frequently, in olden times already, not even used. "A a B" means the same as "A is a B." Only when the preterit, the future, the optative, or the imperative are to be expressed, this carrier of the conjugation endings gets practical value. . . . Hence, when employed alone (and without emphasis), "being" is an empty word.[1]

That Parmenidean *einai*, then, has a verbal stem that has lost its original meaning. That is also why "being" can be attached to, or combined with, any names without increasing or changing their meanings. (A horse that is a horse is exactly the same as, and neither more nor less than, just a horse.)

But this meaningless verbal stem is conjugated. Its forms fill a whole table of conjugation. For what purpose? What is the use of that?

The conjugation forms coordinated to that infinitive serve the

[1] A. Stöhr, *Psychologie*, chapter 124: "Asmi, εἰμί, sum." (2nd ed., Vienna and Leipzig, 1922, p. 427f.)

purpose of *changing a noun into a verb*. Together with that noun, they signify, in the respective tense, an occurrence in which that which is designated by the stem of the grammatical subject of the sentence plays an active or passive or medial role, according as the case may be.

For expression of certain facts, namely, we have at our disposal sometimes verbs and sometimes only nouns. We can say that somebody writes or reads or runs, etc., etc. But if we want to express that somebody is doing good things, we cannot employ a verb such as "to gooden" and say "he goods" because there just is no such verb. So we must, instead, say "he is good." Another instance: All that one does or suffers etc. as a human being can only be expressed by "to be human," since a verb "to human" just does not exist. (In Greek it would be ἄνθρωπον εἶναι [*anthropon einai*], for there is no such verb as ἀνθρωπόειν [*anthropoein*].) Thus, where there is a verb, we do not use a noun with verb, and viceversa. And even in cases where both ways would seem to be in use, there is almost never a complete congruence of meaning.

The stem of the verb *einai* merely carries, and renders pronounceable, the various endings of conjugation, such as signs of time, mode, and person, all of which, however, pertain to the predicate noun, not to the logically functionless stem of the verb. It may be that the infinitive has still kept some meaning as contrast to past or future. But the isolated participle, at any rate, makes no sense whatsoever any more. And likewise completely void of meaning is it to speak of being as such, of εἶναι ἁπλῶς (*einai haplôs*). "Being as such" is nothing at all.

Yet, this "Being as such" was to become the sacred central subject of subsequent Greek philosophy. A contrast to Heraclitus was construed who was labelled "the philosopher of Becoming" whereas Parmenides was "the philosopher of Being." And the two trends were then happily combined in Plato . . .

That whole thing started with Parmenides. It has been thriving ever since and cannot be weeded out any more. Only that today it does not have such simple forms as the Parmenidean *einai*-philosophy. In correspondence with the vast multifariousness of human language, we have now already a whole gamut of complicated glossomorphic philosophies: verb philosophies, noun philosophies, subject-predicate philosophies, subject-object philosophies (very popular), essence and existence philosophies (today the *dernier cri*), and so on, and so forth. In all their variety, however, one of their common features is that in some way or other they are fixed around something.

Glossomorphism is not easy to see through. An understanding has started rather late. Lichtenberg seems to have been the first to find out. In a way, he was preceded by Berkeley, however, by whom another type of glossomorphism has been uncovered: materialism. For this, too, is a glossomorphic construction, ultimately: One sets out from perceptions and then, mistaking the forced metaphor of a perceiving "activity" for an adequate expression, cuts away the "perceiver" and the "act."

Closing In for the Undoing

Parmenides would not have been able to concoct his philosophy in Arabic. There is no real equivalent to *einai* in Arabic [1] or in Hebrew or any Semitic language, for that matter. And completely impossible would glossomorphisms of the Parmenidean type have been in Chinese with its so fundamentally different syntax. *Einai* (*esse, sein*, being, etc.) appears to be an exclusively Indogerm (and purely linguistical) peculiarity.

It has been stated that those syllogisms of Parmenides' "remorseless logic" are faultless and, therefore, irrefutable.

This is true – provided we keep to the outward grammatical form only. By rights, however, a syllogism must contain names as the pillars of the inference, and not merely words, "names" meaning words which cover a notion. A word need not be a name and, on the other hand, even a part of a word can already be a name.

Putting together "not," which taken alone makes no sense, with "being," which taken alone is likewise senseless, Parmenides comes to the doubly meaningless combination "not-being." This is exactly the same as if you were to figure out how much would be $\sqrt{\ } + (\ \ )^3$, with the strict direction not to put any quantity either into the sign of radication or the bracket since here the idea just is to deal with root extraction "as such" without a radicand and with raising to power "as such" without a base.

To fill the completely hollow, completely senseless combination "not-being" with some meaning, one has to complement the "not" to "not-A" or so. But it could, also, be supplemented by "something" to

[1] What could seem to be equivalent, kâna, is in fact not, for it requires the accusative. Averroës (Ibn Rushd) had trouble, and did not succeed, in finding an adequate translation for the Aristotelian *ousia* (οὐσία, "essence") which is the verbal substantive of *einai*. Also the Hebrew *hayah* does not exactly correspond to the Greek *einai*.

"not-something" which then is the same as "nothing." True, "nothing" would still need some supplement (such as "nothing new," meaning "not-[something new]"), since the sign "not" and the name "something" alone cancel each other. But for this very reason it would make good sense to say that there is no nothing-being.

Let us, therefore, replace that "not-being" with either "nothing-being" or "not-A-being" etc., according as it may seem fit, and see whether we arrive at those Parmenidean results:

(1) There is no *nothing*-being.
(2) Becoming A is an initial *not-A*-being.

(3) *No inference possible.*

Likewise:

(1) There is no *nothing*-being.
(2) Changing of place is an initial *not-there*-being.

(3) *No inference possible.*

Likewise:

(1) There is no *nothing*-being.
(2) Having been is a *not-now*-being.

(3) *No inference possible.*

And so forth.

Gradation of Reality

Parmenides was not able to find out that his conclusions were paralogisms.

He was, therefore, in the unpleasant situation that, with all his conclusions, the plurality of being and becoming things could not be removed from the world. Becoming and plurality just would not go away. And so he had to extricate himself by assuming *degrees of reality:* a reality of seeming and a reality of being. The one was the being reality, the other, the becoming reality. Chronologically, this is the first assumption of reality degrees.[1]

Parallel with that, there is of course also the assumption of a *split of the human mind* into sense perception, offering a deceptive seeming, and intellect that alone apprehends genuine being.

Accordingly, Parmenides in his work has dealt with both realms,

[1] Cf. p. 425f.

dedicating one part of his didactic poem to *Aletheia*, the realm of Truth, the other to *Doxa*, the realm of Belief. Thus Parmenides, too, just as Heraclitus, teaches an incessant becoming of the sensible. But he grants it only the lowest reality degree, the verbal reality of nonsense: Even his own presentation in the respective part of his work is, he declares, merely just "a deceptive arrangement of words." [1]

History of philosophy shows that those divisions have persisted through the ages. And yet, all of that unnatural distinction of reality degrees: delusion of becoming and plurality which is less real than being and more real than a dream, while a dream is less real than the sensible world and more than nothing, – this whole distinction is ultimately a consequence of those paralogisms of Parmenides. And so is that division of the mind into the faculties of sensitiveness, as applying to the seeming, and intellect, or "abstract" thinking, as applying to being, a division still to be found even in Kant.

The Parmenidean paralogisms themselves, however, resulted from the non-existence of a reasonable grammar. Only in this way can it be understood how Parmenides could abandon the genuine reality of occurrences in favor of a functionless infinitive.

He must no doubt have been deeply stirred by his discovery that it was possible, ostensibly, starting from what we call the principle of contradiction to arrive at irrefutable cognitions that autocratically contradicted the sense-given facts. What to us is a self-evident, almost boring so-called law of thinking was to him quite an experience, obviously.

Parmenides came across a problem and in his attempt at a solution went astray because his powers were not yet equal to the task. Viewed from this angle, it would seem that his contemporaries who made fun of him were not the stronger but the weaker thinkers. For they were not even able to see the problem, let alone to solve it.

PARMENIDES AND POSTERITY

As we can learn from a remark in Plato,[2] the contemporaries of Parmenides were poking fun at him. Yet, he did impress his disciples and also his epigones.

[1] ἀπατηλὸς κόσμος ἐπέων. (Cf. fr. 8, 52.)
[2] *Parmenides*, 128 C.

Parmenides' Immediate Disciples

In the ancient sources, two men are mentioned as immediate disciples of Parmenides: Zeno of Elea and Melissus of Samos. Whether Parmenides had still other personal adherents, we do not know.

At any rate, these two were the only ones to gain some fame. About Zeno we are told that "he became a highly proficient man in philosophy as well as in politics," [1] and about Melissus we learn that he was such an excellent strategist that he was several times elected admiral of the Samian fleet, and that even the victory of Samos over the Athenian fleet (441 B.C.) under Pericles was to his credit.[2]

There can be no doubt that Zeno must have been involved in politics. Otherwise one would have to consider a mere fabrication the stories (in Diogenes Laertius, Suidas, Diodorus, Plutarch, Clement of Alexandria, Philostratus) about Zeno's plot against a tyrant and about his horrible, abominable death as a consequence of his unsuccessful attempt.

Not quite uniform are the opinions about Zeno's "high proficiency" in philosophy.

Aristotle calls him the inventor of "dialectics," but is intent on refuting his "crude" [3] philosophical performances. In certain quarters, however, he has been taken seriously all through the ages. Proof of it: the way Zeno is treated in Pierre Bayle's (1647–1706) *Dictionnaire historique et critique* (article "Zénon") [4]; the way Hegel (1770–1831), in his *Geschichte der Philosophie* (I 316ff.), reacts upon it by opposing Bayle and siding with Aristotle, though, but finding nevertheless, just as Zeno, a contradiction in the idea of motion, although not denying its existence; and the way Herbart (1776–1841), in complete agreement with Zeno, from that alleged contradiction concludes the perfect irreality of motion. And even today, there are still those to whom "Zeno is a figure of first importance not only in the history of Greek philosophy, but in the history of philosophy in general," [5] and who consider Zeno "clearly a man of exceptionally acute intellect." [5]

But, on the other hand, already in antiquity there were those who

[1] γέγονε δ' ἀνὴρ γενναιότατος καὶ ἐν φιλοσοφίᾳ καὶ ἐν πολιτείᾳ. Diog. Laert. IX 26 (29A1).
[2] Diog. Laert. IX 24 (30A1). Plutarch. Pericl. 26 (30A3).
[3] 'Αλλ' ἐπειδὴ οὗτος θεωρεῖ φορτικῶς . . . (Metaph. II4. 1001 b 13).
[4] 1st ed. (2 voll.), Rotterdam, 1695 and 1697; last ed. (16 voll.), Paris, 1820.
[5] H. D. P. Lee, *Zeno of Elea*, Cambridge, 1936, p. 1; J. E. Raven, *Pythagoreans and Eleatics*, Cambridge, 1948, p. 73; cf. also J. Zafiropulo, *L'école Éléate*, Paris, 1950, p. 167.

would dispose of Zeno in a short and summary way, as did the unknown author of the remark that

> Zeno the Eleatic has produced nothing of his own, but has only become still more confused about these (problems).
>
> Ζήνων δὲ ὁ Ἐλεάτης ἴδιον μὲν οὐδὲν ἐξέθετο, διηπόρησεν δὲ περὶ τούτων ἐπὶ πλεῖον.
>
> *Pseudo-Plutarch. Strom. 5 (29A23).*

An estimation of Admiral Melissus' philosophical exploits will depend on one's basic attitude toward the *Einai* philosophy as a whole. Accordingly, from our view as given in our presentation of the philosophy of Parmenides, the details of the argumentations of Melissus would appear somewhat unsubstantial, and we could rather skip them.

But it is conceded that to all those still pondering about the intricacies of "Being" the utterances of Melissus might mean deepest revelations.

It is remarkable, incidentally, that according to Simplikios (phys. 109. 34 and 87, 6; fr. 9) Melissus has declared that the *Einai*, or *On*, is having "no body" (σῶμα μὴ ἔχειν), is uncorporeal, inextensive, spaceless. This statement would show that those words of Parmenides about the Being as (merely) "*comparable* to the curvature of a well-rounded sphere" were correctly understood by Melissus.

The Zenonic Variety of Glossomorphism

That remark of an ancient Anonymus about Zeno seems to be justified.

If we give credence to what is said in the beginning of Plato's dialogue *Parmenides*, Zeno when in his youth writing a philosophical book had merely the intention of rendering Parmenides – at that time not only his teacher, but also his lover – assistance against those who were making fun of him. Thus, that writing was meant to contain demonstrations in favor of the arguments of Parmenides, but not any original teachings of Zeno himself.

Yet, those demonstrations were to obtain a strange kind of immortality. They have become an ornament of all textbooks of logic, in those chapters which deal with blunders in concluding.

We are going to have a look only at those four of Zeno's paralogisms which, by way of pointing at alleged contradictions in the idea of motion, were supposed to prove that the senses show us nonsense and, therefore, are the conveyers of a deceptive seeming.[1]

Nothing Can Move – If a body shall move from A to B, it has first to get to the half of that distance. But before getting there, it has to get to the half of that half of the distance, and so forth. Since, however, that distance contains an infinity of points, a body is not able even to start moving, let alone to finish running within a finite time through infinite points. Therefore, so the argument goes, motion is impossible and, consequently, what we see with our eyes is not true.

Already Aristotle has retorted by countering that for finishing an infinity of space points there is available also a corresponding infinity of time points contained in the finite time line. Only that Aristotle passes over in silence the main question of how then an infinity of time points can be finished.

But apart from that, Aristotle points at the two different meanings of "infinite": "infinite as to division" (κατὰ διαίρεσιν, *kata diairesin*) and "infinite as to the limits" (τοῖς ἐσχάτοις, *tois eschátois*). By that Aristotle has given us the clue for determining the sort of this Zenonic glossomorphism. It consists in fragmentary expressions, in linguistical gaps not filled in. By contrasting just "infinite" to "finite" the appearance of contradiction comes about. But that something already finished be "finite as to its limits" and "infinite as to its divisibility" does not mean any contradiction at all.

Besides, however, here is at work also a fallacious way of expression, suggestively implying lines to be produced by a summing up of points. Yet, the line is not a sum of points, any more than the plane is a sum of lines. For the point is not a *part* of a line. Nor is a line a *part* of a plane.

When calling, instead, the point the "generating element" of the line, or the line the "generating element" of the plane, we today are liable to get into similar trouble. There is no harm, though, in using this customary metaphorical expression as long as one does not take it literally and draw then consequences from it. For actually lines are not generated by a summation of points or by one point in motion. It is exactly the other way round: we can form points by having two lines intersect, and lines by having two planes intersect. But these are merely constructions within planes, and planes alone are what we actually see. Properly, therefore, we should not call the point the

[1] Zeno's four arguments against motion are discussed in Aristotle's *Physics* VI 9. 239b5–240a18, the first argument also in *Physics* VI 2. 233a21 ff.

"generating element" of the manifold of a line, but rather an intersection from the manifold of a line.

With a moving point a line can be swept through. Yet, the line is already there. It is not produced by that. From calling this a "generation" of the line comes the phrase about "finishing" a line by the movement of a point. "Finishing a line from points" are mere words. It cannot be thought, no matter whether an infinite or a finite number of points is meant.

Neither can one say that a time line results from the summing up of time points:

> For the time is not composed of the inextensive time points.
>
> οὐ γὰρ σύγκειται ὁ χρόνος ἐκ τῶν νῦν τῶν ἀδιαιρέτων.
>
> *Arist. Phys. VI 9. 239b8.*

Already Aristotle is clear about that. There is no time line, in the first place. (Which, however, is not in agreement with Aristotle ...) Time is only a point in which realization and disrealization are continuously meeting. But even if one wanted to think of time as a line, then it would be only just a line, but would not be a sum of points.

It would likewise be misleading, therefore, to call distance the "generating element" of motion and rest, respectively, according to whether or not the distance changes. For motion and rest are not produced from the momentary distances, nor even the imagination of motion and rest from the imagination of the momentary distances. Just inversely, it is the momentary distance pictures that are produced, by our picking them out from a movement.

The difference, however, between motion and rest, between flowing and staying, is an ultimate fact of sensation. Whether in a given case it is motion or rest that is "generated," this is experienced immediately in the so-called occurrence-sensation, a flowing boundary-sensation between an invisible past and an invisible future. (The result itself, namely, the motion along a whole path and the totality of all the different positions with different time values or, in the case of rest, the sum total of the equal positions with different time values, we do not perceive any more.)

Therefore, if one takes literally the phrase of a "production" or "generation" of a manifold "from infinitely numerous time points," the result is of necessity a paralogism. For then such production can never be finished, not even with increased velocity of production. The "time line" can never be finished either in thought or in reality and, hence, the motion supposed to take place in that "time line" cannot be finished, either.

Achilles and the Turtle – Achilles cannot catch up with the turtle. For supposing the turtle has the start of Achilles and, when the race begins, is in the place A_1. When Achilles arrives at A_1, the time t has passed. By then, the turtle is already in the place A_2. When Achilles arrives at A_2, the time t/n has passed. But now the turtle is already in place A_3. And when Achilles reaches A_3 after the time t/n^2 has passed, the turtle is again ahead of him. And so Achilles will never catch up with the turtle. Therefore, what the eyes of a witness of such a race would see: that in a jiffy Achilles would be far ahead of the turtle, would be a mere delusion.

Here a gap is involved that is filled in by the listener in a wrong way. When hearing "never," one involuntarily, in a sort of autosuggestion, complements it to "never in eternity." The correct complement, however, would have to be, of course, "never within the time $\frac{ct}{c-1}$," where c means the velocity of Achilles, measured by the velocity of the turtle as unit.[1]

The Flying Arrow Is at Rest – In each time point of its motion, the flying arrow can be in one place only, not simultaneously in two places. That is to say, in none of its time points does it move, which means it does not move ever. But if it never moves, it does not move at all. It is at rest all the time, consequently. Yet, we do see that the arrow is first here and then there. Therefore, what the senses show is a deceptive seeming, a delusion.

It turns out, however, that not the impressions of the senses, but this whole reasoning is a delusion, a linguistic delusion.

The simplest answer to the question of how the arrow has managed to cross over would be to say that this is just the arrow's own business. It would be the answer of common sense that cannot be talked into things like that. But there is possible also a more philosophical answer.

When hearing that in none of the time points the arrow moves – which is correct –, one is lured into believing that this implies that in each of the time points the arrow rests. In a state of logical half-slumber, one does not become alive to the fact that as to one time

[1] $t/n^0 + t/n^1 + t/n^2 + t/n^3 + \ldots\ldots\ldots = \frac{ct}{c-1}$

point one cannot speak of motion, though, but not of rest, either, just merely of distance. One forgets that the words "rest" and "motion" can be meaningfully employed only as to two or more time points, "rest" if the distance of two things stays unchanged, "motion" if it changes.

A verbal misuse is here at work. It is the same misuse, only not so conspicuous, as if one said of one man that he "encircles" another man, or as if it were proclaimed that "assemblies" of more than one person are forbidden. To speak of rest or motion in one time point is exactly the same nonsensical misnomer. With reference to one time point, one can only speak of distance.

True, the distance itself is perceived in our so-called time point as flowing: now as variably flowing, now as invariably flowing. But when the flux is taken as fixed in a momentary picture, nothing is left but a distance that cannot be called either resting or moved, just as a point cut out from a line is neither straight nor crooked. Or else one could, by the same token, prove that there are neither straight nor crooked lines since the individual points of a line are neither crooked nor straight.

There are cases in which the misuse of a word is blatant and conspicuous. And there are cases in which the misuse is not so conspicuous. This exactly is the important ingredient in the recipe. One has to find out such words where the nonsense is apt to slip by smoothly, and then one just has to be careful not to disturb the rhythm and melody of logic. Then it works, and one can at will imitate those Eleatic sophisms. Only that, as far as the Eleatics are concerned, those showpieces of glossomorphism must not be called sophisms, but paralogisms. For the Eleatics themselves were in deadly earnest about them.

Whole Equals Half – Take three chariots in a stadium.[1] Chariot A stands still in exactly the middle of the stadium. Chariot B, standing at the one end of the stadium, and Chariot C, standing at the opposite end, begin racing toward each other. They have, and carry, the same weight and move with equal velocity. The moment B and C pass by the chariot A, both together have covered the whole distance from one to the other end of the stadium. And nevertheless, at the same moment each of the two chariots has finished only one half of that distance. In

[1] This simplified form may suffice for our presentation. It is meant to substitute for the description as given in Arist. Phys. VI 9. 239b33ff. (29A28) and illustrated by the diagram of Alexander, ap. Simpl. phys. 1016, 14 (29A28).

other words: whole equals half. And since this is nonsense, all motion is merely a delusion of the senses.

Already Eudemos, as has been related by Simplikios, has declared that of all the Zenonic arguments

> this is the most stupid one because here the paralogism is downright palpable.
>
> ὁ μὲν οὖν λόγος τοιοῦτός ἐστιν εὐηθέστατος ὤν, ὥς φησιν Εὔδημος, διὰ τὸ προφανῆ τὸν παραλογισμὸν ἔχειν.
>
> *Simpl. phys. 1019, 32; 29A28.*

Well, there is no reason for us to disagree . . .

Parmenides' Impact on Subsequent Philosophy

It is not from Parmenides' disciples, but from Parmenides himself that that great, persistent influence on subsequent philosophy has been emanating.

His *Einai* became a rock on the road that nobody could afford to slight. One had to heed it and try to get around it in some way or other.

The number of Parmenides' epigones has been growing bigger and bigger and does not seem to diminish even today.[1]

There were those who just humbly submitted to the fascination of that hypnotic "Being is, not-being is not" with all its consequences, as did Euclid of Megara [2] who simply equated the Parmenidean Being and the (Socratic) Good: There is only one Being, the Good, that is always and everywhere the same and merely has a number of different names, such as god, happiness, world order, etc. And the Not-Being is the Not-Good, the Bad. The Bad, therefore, does not even exist at all . . .

But there were also those who after a while of fascination became reluctant fully to agree.

The One 'Einai' and the Many 'Ontos Onta'

Plato could not help being strongly impressed by Parmenides, occasional mockeries at "those Melissusses and Parmenidesses" [3]

[1] Best proof is a statement like this: "Für uns ist diese Lehre (sc., of Parmenides) über alle Maassen ehrwürdig, weil sie zuerst den Begriff des Seins in das abendländische Denken einführt, und weil wir wissen, was Platon und Aristoteles aus ihr gemacht haben." (Olof Gigon, *Sokrates. Sein Bild in Dichtung und Geschichte*. Bern, 1947, p. 213.

[2] 450–380 (?) B.C.

[3] *Theaetetus* 180 E.

notwithstanding. His Ideas – designed to explain the mysterious fact that we can use universal names for individual things – are indeed direct descendants of the Parmenidean *Einai* with all its characteristic properties, the next of kin in this genealogy having been the Good of Euclid of Megara with whom Plato stayed for quite a while after the death of Socrates.

However, though obviously Euclid's equation of Being and Good caused Plato to bestow on the Good the rank of the highest and noblest of the Ideas, he could not avail upon himself to submit to the oneness of the *Einai* by making the Good the only Idea. Plato just could not go along with those Parmenidean conclusions about the alleged nonsense of plurality and the alleged deceptiveness of the occurrences. His sound linguistic instinct kept him from adopting the one conclusion, his sound instinct for fact, from accepting the other one.

After having, in other dialogues, struggled in vain against Parmenides' "remorseless logic," Plato finds his way out in the *Sophistes*. Here he dares to be downright recalcitrant and declare that the being, though it certainly is, likewise is also not:

> To us, then, the being as many times is not as there are the others. For by not being those, it is one itself and, on the other hand, innumerable times is not the others.
>
> καὶ τὸ ὂν ἄρ' ἡμῖν, ὅσαπέρ ἐστι τὰ ἄλλα, κατὰ τοσαῦτα οὐκ ἔστιν· ἐκεῖνα γὰρ οὐκ ὂν ἓν μὲν αὐτό ἐστιν, ἀπέραντα δὲ τὸν ἀριθμὸν τἆλλα οὐκ ἔστιν αὖ.
>
> *Sophistes 257 A.*

But how does Plato justify such contradiction of the Parmenidean Truth?

With all his correct linguistical instinct, Plato was still unable simply to say that one must draw a distinction between μὴ ὄν (*me on*, "not being") and μὴ τόδε ὄν (*me tode on*, "not A being"), and that *me on* is a senseless combination, while *me tode on* is a negative name for quite a positive meaning: that positive which can remain after removal of the positive A, and which then is a positive sample from the positive notion field of the notion not-A which is a notion derived from A.

This is not yet possible for Plato. He is not yet able to brush that whole thing aside as a glossomorphism, as a word philosophy. He takes it seriously and extricates himself in a curious way:

He does nor refuse to operate with *me on*, but instead tries to mediate by giving *me on* the meaning of *me tode on*. He pretends that

me on, "not-being," does not mean the contradiction of being, but another being:

> Whenever we speak of the not-being, we speak, it seems, not of anything contradictory to the being, but merely of some other being.
>
> ὁπόταν τὸ μὴ ὂν λέγωμεν, ὡς ἔοικεν, οὐκ ἐναντίον τι λέγομεν τοῦ ὄντος, ἀλλ' ἕτερον μόνον.
>
> *Soph. 257 B.*

This is not true, of course. But Plato just attributes to the *me on* all that can be attributed only to the *me tode on*. And so, replacing the *me on* by *to heteron* (τὸ ἕτερον, or *thateron*, θάτερον), "the other," he comes to say:

> Therefore, it seems, the opposition of the nature of the other part and of the nature of the being – which are opposed to each other – is no less, if that is allowed to say, an essence of the being itself, (an opposition) indicating not anything contradictory to that (sc., not the contradiction of all being), but merely not more than something different from it.
>
> οὐκοῦν, ὡς ἔοικεν, ἡ τῆς θατέρου μορίου φύσεως καὶ τῆς τοῦ ὄντος πρὸς ἄλληλα ἀντικειμένων ἀντίθεσις οὐδὲν ἧττον, εἰ θέμις εἰπεῖν, αὐτοῦ τοῦ ὄντος οὐσία ἐστίν, *οὐκ ἐναντίον* ἐκείνῳ σημαίνουσα, ἀλλὰ τοσοῦτον μόνον, *ἕτερον* ἐκείνου.
>
> *Soph. 258 A, B.*

Thus, according to Plato, the *me on*, or "not-being," would express, not the contradiction of the being, but the being contrast (*antititheme-non*, ἀντιτιθέμενον) to another being:

> We, however (sc., in disagreement with Parmenides), have demonstrated not only that the not-beings are, but have also shown the kind (of being) which the not-being happens to be. By demonstrating, namely, that the nature of the Other not only *is*, but also has been scattered over all the beings in their relationship to each other, we have dared to say that every part of it (sc., of the nature of the Other), as opposed to the being, is in fact exactly that which the not-being is.
>
> ἡμεῖς δέ γε οὐ μόνον ὡς ἔστι τὰ μὴ ὄντα ἀπεδείξαμεν, ἀλλὰ καὶ τὸ εἶδος ὃ τυγχάνει ὂν τοῦ μὴ ὄντος ἀπεφηνάμεθα· τὴν γὰρ θατέρου φύσιν ἀποδείξαντες οὖσάν τε καὶ κατακεκερματισμένην ἐπὶ πάντα τὰ ὄντα

πρὸς ἄλληλα, τὸ πρὸς τὸ ὂν ἕκαστον μόριον αὐτῆς *ἀντιτιθέμενον* ἐτολμήσαμεν εἰπεῖν ὡς αὐτὸ τοῦτό ἐστιν ὄντως τὸ μὴ ὄν.

Soph. 258 D, E.

Any positively being, therefore, has not only its own one being, according to Plato, but also the one being-the-counterpart-to-its-counterpart and the innumerable being-other-than-the-otherwise-beings. (What in fact, namely, are various manners of conceiving and naming and, hence, *products* in our intellect, are to Plato still *objects* given to our intellect.)

That is how Plato accounts for his substitution of the many *Ontos Onta* (ὄντως ὄντα) [1] for the one *Einai* of Parmenides.

But not only can he in this way maintain the plurality of his Ideas. He also need no longer equip those "thinkable and bodiless forms" [2] merely with rigid being (οὐσία, *ousia*). He now can endow them also with motion (κίνησις, *kinesis*), life (ζωή, *zoe*), consciousness (ψυχή, *psyche*), thinking (φρόνησις, *phronesis*), and "lofty and holy intellect" (σεμνὸς καὶ ἅγιος νοῦς, *semnos kai hagios nous*).[3] For now motion, e.g., has not only its becoming, but also its being: the being-different from the being of rest ...

True Belief instead of Deceptive Belief

One of the persistent items of the Parmenidean heritage is that unbridgeable split of the human mind into intellect and sensitiveness.

According to Parmenides, the one, sole *Einai* is the only object of the intellect since being alone is thinkable because thinking and the thinkable, *i.e.*, being, are identical. Everything else, however, all that becomes – all that becomes seen, heard, done, suffered, loved, hated, etc., in short, all occurrences – are delusions of the senses, and our belief in them is a belief in a "deceptive arrangement of (mere, empty) words."

[1] *Ontos on* is the most characteristic term for "Idea" in the *Timaeus*. It does not mean "truly being." It means "in a being way being," as contrasted to "in a becoming way being," just as the synonymous term "the being which is" (τὸ ὂν ὅ ἔστιν, *to on ho estin*) implies, as its contrast, "that being which becomes" (τὸ ὂν ὅ γίγνεται, *to on ho gignetai*). A horse is by being. It need not run, in order to be. But the running horse is by doing, not by being, and the saddled horse is by suffering. In other words, *ontos on* or *on ho estin* is everything that can be expressed grammatically by nouns, by substantives and adjectives that is, but not by verbs.

[2] νοητὰ ἄττα καὶ ἀσώματα εἴδη (*Sophistes* 246 B).

[3] Cf. *Sophistes* 248 E, 249 A.

Plato does not accept the oneness of the *Einai*. But he is not able to get rid of that cleavage in the mind. Accordingly, he divides his one, *monogenés* world into two realms, the "world" of the thinkable, or *kosmos noetós*, and the "world" of the sensible, or *kosmos aisthetós*.

However, his sound instinct for fact does not let him take the *kosmos aisthetós* for a realm of delusion and deception. To him it is

> that which is considered real (δοξαστόν) with the aid of the not-intellectual (faculty of) sensation by way of belief.
>
> τὸ ... δόξῃ μετ' αἰσθήσεως ἀλόγου δοξαστόν ...
>
> *Timaeus 28 A.*

Yet, it is meant as a genuine reality. It is something that one rightly believes in. Such belief, or *doxa*, is not a deceptive, but a true belief, not *doxa* as contrasted to *alétheia* any more, but itself an *alethés doxa*,[1] a firm and rightful belief in the reality of the sense-given impression. And such belief is not of a logical, intellectual nature and cannot be obtained by means of thinking. For there is no comprehending why a thing must appear just here and now, and if one knew that cause, one would not know why it causes this effect, and if even this were known, one would again not know why that cause appears exactly here and now.

Thus, *what to Parmenides is a worthless, fallacious belief in a deceptive arrangement of empty words becomes with Plato a true and reliable belief in the genuine, though logically unintelligible reality of "Becoming."*

But that Parmenidean cleavage itself persists with Plato.

On the other hand, however, just as with Parmenides, so with Plato there is no division into subject of thinking, act of thinking, and contents of thinking. The *ontos onta* are thinking themselves, they are their own contents of thinking.

The 'Einai'-Philosophy of Aristotle

This Parmenidean heritage is taken over by Aristotle from his teacher Plato.

The split into *aisthesis* and *noesis*, into sensation (and imagination and dream and hallucination), on the one hand, and abstract, or (as Kant would say) "discoursive" thinking, on the other, is even particularly emphasized by Aristotle, and so much so that his *psyche aisthetiké* and his *psyche dianoetiké* are not perhaps just different functions of the same psyche, but completely different things, the one tied to the sense

[1] Cf. *Timaeus* 51 D, also 37 B.

organs of the body and therefore mortal, the other – just as the Platonic *ontos onta* – not tied to any bodily organ and therefore immortal.

But Aristotle, too, draws not yet any distinction between subject, act, and content. *Aisthesis* means to him no act of perceiving, but the sum total of the percepts, the *aisthetá*, and *noesis*, or *nous*, is likewise just the sum total of the thoughts, or *noetá*. Also the god of Aristotle is totality of the *noetá*, but perpetually and actually thought and united into one consciousness-unit.

And just as the Platonic Ideas, or *Ontos Onta*, are a multiplication and amplification of the one *Einai* of Parmenides, so is their Aristotelian counterpart, those innumerable unchangeable and eternal Forms, or Kinds of Being.

The Aristotelian doctrine, too, is an *Einai* philosophy, only much more complex and elaborate than the simple Parmenidean pattern. The main difference is that Aristotle always, except with reference to his god, speaks of Being only in combination with another word, such as man-being, horse-being, good-being, bad-being, etc. The *noetá* are judgments predicating one being of another being, of the horse-being, for instance, the animal-being, by way of finding out in what way one being participates in another being.

In this manner Aristotle builds up – in his (later so-called) *Metaphysics* as well as in his alleged logic, the *Organon*, – a manifold, artful, articulate philosophy of Being.

Yet, – those predications are possible only where there is some *einai*. The whole edifice, therefore, of Aristotle's *prote philosophia* could not have been erected but in an Indogerman language.[1] . . .

Supported by the authority of Plato and Aristotle, the *Einai* has become an integral ingredient of Western philosophy.

A detailed history of the Parmenidean heritage would have to fill quite a number of big volumes. Suffice it to say that, strictly speaking, only since the birth of comparative linguistics some hope has arisen for the dissolution of this type of philosophy in a far distant future . . .

[1] "Man sieht . . ., dass Aristoteles seine (indogermanische) Kategorienlehre nicht hätte aufstellen können, wenn er als Araber oder als Chinese bei sonst gleicher Intelligenz zur Welt gekommen wäre." Adolf Stöhr, *Lehrbuch der Logik in psychologisierender Darstellung* (Leipzig and Vienna, 1910), p. 171.

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